

LOOKING FORWARD

WA's resources sector enters new territory

PROSPECT





Western Australia's resources sector continues to be the major economic driver for the State despite facing a series of headwinds during 2014 (story page 2).

For the 2013–14 financial year, the value of the State's mineral and petroleum industry increased by almost 20 per cent to A\$121.6 billion, a new record.

Production of iron ore and other commodities, including gold, copper, lead, salt and diamonds also increased, and there was substantial growth in the value of petroleum sales.

LNG production in WA is set to grow substantially in coming years with an ongoing exploration in shale gas and as new projects come online. Construction of the Gorgon and Wheatstone projects in our north west are 85 per cent and 50 per cent complete respectively.

As evidenced by the growth of companies such as Immersive Technologies (story page 7), there are significant opportunities for industries that support the mining sector. With additional investment in these areas and further innovation in the State's agriculture industry, the diversification of Western Australia's economic interests continues.

I am pleased to see the progress made to date on the development of the Anketell Port project (story page 27), which will provide a new avenue for iron ore producers in particular to get their product into the market.

With the modernisation of the State's safety legislation (story page 24), and an efficient system of approvals processes that is the envy of other jurisdictions (story page 23), the Department of Mines and Petroleum continues to provide a stable legislative environment that enable proponents to enter into projects with confidence.

The year ahead is likely to present its challenges but Western Australia's strong foundations and increasingly diversified economy ensure we are well-positioned for growth in 2015.

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Cover photo: BHP Billiton's iron ore operations in the Pilbara. © BHP

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In this issue



02 The road ahead for Western Australia's resources sector

After a record-breaking year, *Prospect* looks at what's in store for the State's resources industry.

06 Champions of innovation

This year's winner of the Curtin Commercial Innovation Awards has highlighted the link between Western Australian universities and the mining industry.

09 Seminar offers advice, support for Chinese investors

Representatives from the Western Australian Government have visited China to deliver presentations on the State's approval processes.

12 Mining Rehabilitation Fund celebrates successes to date

Having been implemented 18 months ago, DMP's online registration system has been warmly received by industry.

17 Groundwork laid for LNG 18

Arrangements for the LNG 18 International Conference and Exhibition, to be held in Perth in 2016, are rapidly taking shape.

24 Modernising WA's safety legislation

Changes to Western Australia's resources industry safety legislation will focus on reducing risk in the sector.



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THE ROAD AHEAD FOR WESTERN AUSTRALIA'S RESOURCES SECTOR

With heavy capital investment in new projects maturing and resulting in higher and more efficient levels of resource production and exports, the Western Australian resources sector is now in transition.

Despite some challenges ahead, the outlook is bright.

Commodity prices remain high by historical levels, but recent price falls and uncertain global economic conditions have caused some mining companies to re-evaluate their investment positions.

The State is competing for capital from other mining jurisdictions, notably the emerging resource countries in Africa, such as South Africa.

However, Western Australia has some notable advantages over its competitors.

The State has stable government, established infrastructure and a more readily available skilled workforce.

In addition to ongoing and planned future development, a new section of the resources industry is emerging in Western Australia.

Shale and tight gas has the potential to become a significant component of Australia's domestic energy supply and could make a major contribution to future export earnings.

A major reason for optimism about the future of the State's resources is an endorsement by the Fraser Institute's 2013 Annual Survey of Mining Companies.

The Fraser Institute is an independent research and educational organisation based in Canada and the survey assesses how public policy factors such as regulatory certainty affect exploration investment.

The institute ranked Western Australia in sixth position out of 112 globally in its Policy Perception Index.

The State was also again ranked the number one resources jurisdiction in Australia and ranked number one overall globally in terms of mineral potential.

These results make Western Australia the top jurisdiction for investment attractiveness for the first time in the history of the survey.

Setting the pace

The value of Western Australia's mineral and petroleum industry in 2013–14 set a new record of A\$121.6 billion, an increase of nearly 20 per cent compared to the previous financial year.

The Department of Mines and Petroleum's (DMP) latest resources statistics at the time of going to press show that iron ore remained the State's highest value commodity, with a record A\$73.7 billion in sales.

Project expansions and continuing strong demand led by China resulted in exports of 631 million tonnes, an increase of 23 per cent on 2012–13, along with a 31 per cent increase in value compared to the previous financial year.

Growth in other parts of the State's mining and petroleum industry also helped support the value of the State's resources industry.

In 2013–14 there was increased output of gold, copper, lead, salt and diamonds and a significant rise in the value of petroleum sales, with LNG sales alone increasing by more than A\$1.9 billion to A\$14.4 billion.

Gold was the second most valuable mineral sector, with total sales of A\$8.8 billion, followed by alumina at A\$4.2 billion, then nickel at A\$3.5 billion.

The new record was primarily the result of a weaker Australian dollar, which was an average 10.5 per cent lower compared to the previous year, aided by an increase in the value of iron ore produced.

Western Australia also remained the nation's leading mining investment destination, attracting 52 per cent of total national capital spending valued at A\$90 billion.

Fuelled by strong demand for resource commodities from Asia, new capital expenditure by the State's mining industry has grown at an annual rate of 15 per cent during the five years to 2013–14.

As at September 2014, Western Australia had an estimated A\$160 billion worth of resource projects under construction or in the committed stage of development.

A further A\$108 billion has been identified as being allocated to planned or possible projects in coming years.

Keeping costs down

To keep investment interest keen, the State Government is determined to maintain its focus on making sure Western Australia is cost-competitive in a global market.

To help achieve that aim, DMP is administering an ongoing program to cut red tape and reduce costs to both government and industry.

A key area where DMP has streamlined procedures is the continuing reform of its approvals system that began in 2009.

The department now has a seamless system that delivers approvals within a competitive and efficient timeframe while serving the public interest and ensuring responsible resources development.

DMP's September quarter approvals performance report has shown continued strong performance across a number of key approval processes.

The report shows the majority of key approvals were addressed within target timelines, even though there was an increase in the number of applications received in several categories.

The department received 1009 Mineral Tenure Applications, 477 Program of Work Exploration applications and 60 Mining Proposals during the quarter.

The Productivity Commission Inquiry Report released in March this year identified DMP's approvals reform as an example of leading practice for regulators in Australia.



The report praised the use of online lodgement and approvals tracking, the publication of how the department is performing in approvals, and the overall transparency of its processes.

Examples of innovations now driving down industry costs are the introduction of the unique and internationally studied Mine Rehabilitation Fund (MRF) and the Exploration Incentive Scheme (EIS).

The MRF essentially replaces environmental bonds and reduces imposts on industry by introducing a risk-based approach that avoids duplication and overlapping processes.

The fund has freed up much-needed investment capital – particularly for small to medium sized companies – and ensured an ongoing source of funds to protect the environment and rehabilitate abandoned mines.

Encouraging industry

DMP supports industry by providing incentives for explorers to drill in underexplored areas through the EIS Co-funded Drilling Program – which offers two rounds of co-funding a year to drilling projects.

Round 10 is now open to encourage exploration drilling projects in 2015.

Since its inception in 2009, the scheme has offered almost A\$50 million in grants to more than 460 exploration drilling projects.

The State Government's commitment to explorers under the EIS is expected to reach about A\$130 million by 2016–17.

Since 2009, the EIS has helped to bring about a number of achievements, including:

- Deep exploration drilling under the Mount Magnet Gold mine which resulted in the re-opening of the mine in 2011.

- Discovery of the Nova nickel deposit using pre-competitive geoscience provided by DMP to target the drilling program.
- Discovery of the Oxley potash deposit by Sheffield Resources.
- Discovery of a new kimberlite field by Meteoric Resources.

An efficient and trusted regulator

DMP is focused on fostering growth in the resources sector but is always mindful of its duties and responsibilities as an efficient and trusted regulator.

The department is working constantly with industry to ensure that resilient safety cultures are the norm and that best practice standards are adopted throughout the sector.

Western Australia has moved to a risk-based approach to mine safety that puts the responsibility on companies to understand the hazards and risks of their workplace and demonstrate that they are operating as safely as possible.

The department has made great strides in safety reform, moving away from a prescriptive model of regulation enforcement to a system that is more focused on working with and educating industry.

The new approach is part of a program called Reform and Development at Resources Safety (RADARS) which began in 2010 in response to industry fatalities in previous years.

This ground-breaking reform was achieved after extensive consultation with industry.

The department has also implemented an Attraction and Retention Incentive program to encourage highly-qualified staff to stay on.

DMP has employed similar forward thinking on the environment front, where there has been a continuing campaign of reform since 2009.

Duplication of regulatory approvals has been cut, online lodgement of approvals has been introduced and community engagement is now an integral part of the department's continuing Reforming Environmental Regulation (RER) program.

Investing in the future

The State Government is continuing to encourage technological innovation through the Minerals Research Institute of Western Australia (MRIWA).

Top quality research improves the likelihood of commercial success for new mining and resource extraction projects in WA.

MRIWA plays a vital role in establishing Western Australia as an international centre of excellence for minerals research and has published more than 300 research reports.

The institute provides and administers financial grants for minerals research to support and encourage the ongoing development of the minerals industry in Western Australia.

The grants program is directed to areas most likely to deliver tangible benefits to the minerals industry and the State.

MRIWA also partners with Curtin University, Edith Cowan University, Murdoch University and the University of Western Australia, offering annual scholarships to foster the next generation of researchers who will strive to give Western Australia the edge in the crucial area of pre-competitive research.

IN IT FOR THE LONG HAUL

While its name may not conjure images of the Pilbara as quickly as other mining giants might, there is no debating the importance and influence of Mitsui & Co's position in the resources industry in Australia.

From coal and infrastructure investments in the east, to salt and iron ore projects in the west, Mitsui is a long-term investor in Australia with a history that spans some 113 years. By anybody's measure, it's a remarkable achievement.

Opening its first office in Australia in Sydney in 1901, Mitsui played a pivotal role in the development of Australia's key export commodities at the time, namely wheat and wool. In 1925, it shipped a then-record 40,000 tonnes of Australian wheat to Japan.

Following the disbanding of the original company, Mitsui re-entered the Australian market in 1955 and quickly started exporting Australian agricultural and mineral commodities to Japan. The first office in Western Australia then opened in Fremantle in 1963, laying the foundation for what is now a vast and varied export portfolio.

General Manager of the Mitsui & Co office in Perth, Mr Keizo Sakurai, explained the beginnings of the venture into the west.

"We started with wool and cotton trade in Fremantle, and thereafter moved into iron ore exploration and development. A key moment for us, and for Japan, was when the Australian Government lifted the ban on the export of iron ore in 1960, and then other business followed," Mr Sakurai said.

Additional investments included salt in the 1970s, a move into oil and gas in the 1980s, and the recent acquisition of a 25 per cent stake in Plum Grove, a grain accumulation company in Fremantle.

These wide-ranging interests have positioned Mitsui as one of Australia's leading exporters of natural resources and agricultural commodities. In fact, on an equity basis, the company is the fourth-largest exporter in Australia with over A\$8 billion in total exports per year.

Altogether, Mitsui Group companies have invested more than A\$14 billion in Australia over the last decade, due in no small part to the favourable business conditions that exist in the country.

"Australia has a very transparent regulatory environment, the government is stable and there is a robust legal system, which creates a very good atmosphere for us in terms of investment," said Mr Sakurai.

"Our experience investing in Australia has been overwhelmingly positive, and Japan and Australia have a built a very successful economic relationship founded on trust and goodwill.

"Western Australia specifically has been a great host state for Mitsui, and we have been able to achieve our growth by working in partnership with the Western Australian Government and our joint venture partners."

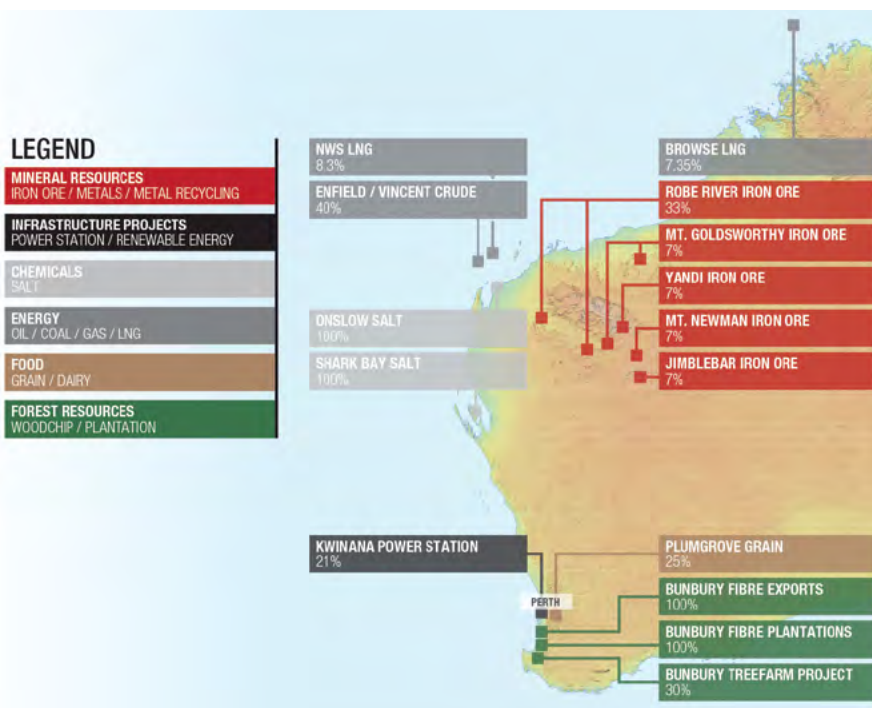
As well as its hefty financial contribution, Mitsui fosters a positive cultural and social relationship between the two countries through the Mitsui Education Foundation (MEF). Established in 1971, the MEF sponsors an annual study tour to Japan for Australian university students, introducing them to various aspects of Japanese culture, history, business and lifestyle. To date, 329 students have participated in the program.

This close and mutually beneficial partnership shows no signs of slowing down, with the agricultural sector featuring prominently in Mitsui's future plans.

"Our target is to handle three million tonnes of grain from Australia by 2020, and I think that would be the equivalent of 10 per cent of the total Australian grain market," Mr Sakurai said.

"Food security is a key global challenge and we'd also like to expand our agribusiness to ensure a stable supply of safe, reliable food to Japan and other global markets, and Australia is a great supply base as it's well known for its high quality food."

As evidenced by its formidable track record, there is every reason to expect that Mitsui's shift into agribusiness, and whatever sectors it turns its attention to beyond that, will be marked by great success.



Mitsui is involved in a number of diverse projects in Western Australia.



Q&A WITH CRAIG PEACOCK, COMMISSIONER

Can you describe your role? What does an average day entail for you?

My primary role is to facilitate trade from Western Australia to Japan and promote investment from Japan into WA. I'm a great believer in the notion that investment follows trade like night follows day. When you establish a trade relationship, you incite possible interest in an equity position in the supply chain, or you may lure interest in an actual acquisition. A typical day for me involves a high level of engagement with industry in Japan, applicable engagement with government agencies and ministries where they pertain to trade or investment, and a reasonable amount of liaison and teamwork with the Australian Federal Government via the Embassy.

The Australia-Japan Economic Partnership Agreement (JAEPA) signed earlier this year was a landmark trade deal for both Australia and Japan. What do you think are the key opportunities for Western Australian businesses in Japan?

We were quite happy with what came out of the EPA/FTA, but there were some things that could have been negotiated more stringently – the grain tariff and quota system, for example. We did score some immediate wins, such as seafood and wine; however with seafood we need to have direct flights to take full advantage of live product opportunities. We are at present working with one airline to make a case for direct flights between Tokyo and Perth, a route Qantas unwisely cancelled in 2011. I believe the feasibility studies are positive. Direct flights will allow us to bring back the live seafood trade and it will also allow an easier flow of business traffic. Importantly, it will boost tourism. Overall though, agriculture is the big winner of the agreement.

And vice versa, what is Japan seeking from WA?

Japan will have cheaper Australian product on its shelves and cheaper Australian food on their plates. The major success for them is automobiles. With the winding down of our auto industry we'll see more Japanese cars here, and if there is no import duty on those it is better for the consumer and better for the manufacturer. I believe we will see a greater number of cheaper Japanese cars in Australia. That is good for WA because the cars are often made of steel produced from WA hematite.

Japan is often recognised as a discerning market. What advice would you give Western Australian companies looking to expand into Japan? What is the key to success in the Japanese market?

Always have a long-term view and always be open to partner with your counterpart in Japan. The Japanese are very interested in long-term market strategies – there is little quick win consideration for them. Of course, if they achieve a quick win that's fine, but they are more interested in having a long-term market and developing that market together with their supplier. Contracts are respected as binding agreements. In the many years I've been a part of the Australia-Japan relationship, I have never seen a Japanese company not honour a contract. They are aiming at forming win-win partnerships and I believe that is visible in the Japanese corporate presence in Perth. There is ample evidence that they are very good corporate citizens – they make meaningful contributions to society, education and culture.

You have been Western Australia's Commissioner in Tokyo since 2002. In your experience, has the trade and investment relationship between Western Australia and Japan changed in the last decade? If so, how?

When I was first in Japan it was the peak of the 'old' relationship we had with the country. In the late 80s we were heading towards almost one million tourists from

Japan per year. However during the years that China began to emerge Japan felt extremely unloved by its old friend and ally Australia – everything became focused on China, far less attention was given to Japan and the relationship was not nurtured in the way it should have been. I think we are now entering a newly invigorated period of friendship and mutual respect with Japan. There is no greater evidence of that than the Japanese Prime Minister's recent visit to Australia and WA. The visit was very definite recognition that the Japanese regard Western Australia as being a highly important component, if not the most important component, of their relationship with Australia.

What are your main goals in the Japan market going forward?

My main goal is to increase investment in our resources sector, and to keep investment and trade in general ticking over. Japan already has strong investments and expanding interest in WA, so we need to continually nurture that. Additionally we are striving to bring new focus on agriculture and new investment into the sector. The potential is there and the possibilities are vast, but we cannot be complacent, we must be active in showing Japan where its investments may best serve them. Japan, like many countries, has an urgent need for both energy and food security. Energy security we provide and we will continue to do that. Japan is our largest LNG market and it will be that way for many years to come as their market for LNG grows. Agriculture is another matter. We need to prove we are as capable of providing Japan with food security as we are energy security. This is the key to mutual prosperity with our oldest and firmest friend in Asia.

CHAMPIONS OF INNOVATION

A meter that improves the amount of gold obtained from a common extraction process has taken top billing at this year's Curtin Commercial Innovation Awards.

The award is further evidence of the strong collaborative bond between universities and the resources sector in Western Australia, a relationship which has given rise to ground-breaking research to identify and overcome industry challenges.

With the highest rate of business investment in research and development throughout Australia, the State is firmly established as a hub for scientific and technological innovation.

Established in 2007, the awards celebrate the innovative ideas of Curtin University staff and students and provide a supportive environment for entrants as they attempt to commercialise their innovation.

As explained by Rohan McDougall, Director of IP Commercialisation at Curtin University, the awards offer more than just financial prizes, helpful though they are.

"We encourage entrants to engage with market experts who can provide guidance on the direction of their work and help navigate common hurdles in commercial development," he said.

"We try to match all entrants with an industry expert from the market sector where their technology will be applied."

One entrant who has benefited from this assistance and knowledge sharing is iCetana, a software company that has developed a video analytics application based on a patented innovative technology for anomaly detection in large data sets.

Runner up in the awards in 2009, iCetana's software has been implemented in a number of sites around Australia, with the focus now shifting to overseas expansion.

"We're doing some work in the Middle East, Hong Kong, Singapore and the US," said Gary Pennefather, CEO of iCetana, "but because of the type of space we're in, internationalising our product has been quite a difficult task and a fairly slow process."



Curtin University Vice Chancellor Professor Deborah Terry, left, presents the 2014 Award to Ms Teresa McGrath and Professor Jacques Eksteen. Photo: Curtin University

"The Curtin Commercialisation Innovation Award helped us build a bit of a profile and it was good exposure to investors – in a sense, it was a form of validation."

Echoing those thoughts was Mark Stevens, Managing Director of Skrydata, the company whose unique data discovery technology took out the award in 2010.

"One thing about the Curtin awards that was really beneficial was that we had to get our product presentation down to five minutes, and when you go out to see potential clients, you need to have that level of clarity," he said.

"In terms of advice for commercialising an innovation, I'd say that understanding your sales cycle, and in particular how long the process will take, is crucial. Another important step is acquiring a couple of high profile customers who are either willing to let you use their name, or do a case study – establishing credibility is essential."

In an exciting development for the business, Skrydata's innovation is currently being applied to the resources sector. The technology allows for monitoring and analysis of the drilling process, and initial tests suggest the captured data can indicate when equipment may break or encounter a problem before it happens.

Another Curtin initiative that aims to promote innovation is the OzAPP Awards, which came out of the appointment of Silicon Valley-based investor Bill Tai as an adjunct Professor of Innovation at the university.

Initially aimed at testing the level of technology entrepreneurship in Western Australia, the program has now expanded to identify the best new mobile, web or cloud computing app in Southeast Asia, with the overall aim of building a vibrant community of entrepreneurs, investors, developers and researchers.

A MODEL SOLUTION

Credited with releasing the first haul truck simulator in 1998, Immersive Technologies, with its global head office located in Perth, continues to lead the way in providing simulator training solutions to the mining industry.

The company was established in 1993 and has gone on to develop a number of simulators with advanced technologies that have set the benchmark in the mining industry.

The success of Immersive Technologies' research and development is demonstrated in their collaborations with leading equipment manufacturers such as Caterpillar, Komatsu, Liebherr and Hitachi.

Currently, Immersive Technologies has simulators deployed in 38 countries across hundreds of mining sites. The company's simulators allow the operator to practice in the face of a range of potential emergency situations, many of which are too dangerous, difficult or expensive to test in an actual mine.

However, as outlined by Executive Director of Marketing Wayde Salfinger, the benefits

to companies amount to more than just improved safety conditions.

"This training technique has delivered quantified improvements to mining operations around the globe, including longer tyre life, reductions in fuel consumption and reductions in unscheduled maintenance," said Salfinger.

"The use of our mining simulators is recognised as global best practice, and they're used to train new operators, improve those with experience, drive continuous improvement projects and deliver real results in areas of safety, productivity and unscheduled maintenance."

Immersive Technologies' success is underpinned by two decades of simulator research and development, resulting in the creation of specialised knowledge. The company's PRO3-B simulator for surface mining and IM360 for surface and underground mining are now established as industry standards.

"The visual systems, dynamically adjusting operator views and motion technologies

deliver levels of simulation immersion not previously available to the mining industry," said Salfinger.

Not content to rest on its laurels, Immersive Technologies has now started to deliver simulation-based training for autonomous mining, with the first instance of its blended learning training centre integrated at a copper mine in Chile.

Like its work with manufacturers such as Caterpillar, the company developed its training solution in conjunction with the mine operator and provided a customised product.

The introduction of autonomous operations to mine sites requires in-depth procedural training and assessment, and Immersive Technologies has addressed this need through a combination of computer-based training, the use of a virtual classroom and simulator training.

As productivity and operational improvement become increasingly important in the resources sector, it seems there's little doubt the demand for Immersive Technologies' innovative training solutions will only continue to grow.



Immersive Technologies' advanced simulator training solutions in action. Photo: Immersive Technologies

SENIOR DMP GEOSCIENTISTS COMPLETE JOINT FIELDWORK WITH CHINA



The joint Geological Survey of Western Australia (GSWA) and China Geological Survey (CGS) field trip to the northern Tibet Plateau.

A senior delegation from the Department of Mines and Petroleum (DMP) returned last month from a tour to mark the end of the main phase of geological mapping in China's Gansu Province.

The 12-day tour led by Geological Survey of Western Australia (GSWA) Executive Director Dr Rick Rogerson, was part of a high-level Memorandum of Understanding (MoU) between DMP and the Chinese Ministry of Land Resources.

GSWA's *Cooperation in Geoscience* MoU with the China Geological Survey (CGS) is the first major joint venture project with an Australian state geological survey and has already resulted in joint mapping exercises in the Yalgoo area of WA's Murchison region, and the north-west of China's Gansu Province.

The Beijing-based geoscientific organisation also has six regional centres where pre-competitive projects are undertaken, along with research into geohazards such as coastal engineering, landslide risk mitigation and seismic-related damage litigation.

CGS identified GSWA as an organisation that was well-suited and well-recognised internationally to help them improve Chinese mapping techniques.

"The China Geological Survey wanted us to share the way we do things, and we went over to China to share our techniques and our mapping process, with an emphasis in understanding geology, rather than just doing maps," Dr Rogerson said.

The tour included a two-day workshop with Chinese government officials and exploration and mining groups from surrounding regions.

Following the workshop, Dr Rogerson and two other GSWA experts joined a joint GSWA/CGS field trip to the northern Tibet Plateau for three days of on-field discussions, including ongoing activities under the MoU beyond 2014.

He said there were also benefits to GSWA geoscientists being exposed to younger, well-exposed examples of rocks and the rock systems in China, and it was an important learning experience.

Dr Rogerson said much of the geology of WA is extremely old, highly deformed and

poorly exposed, and geologists rely on the 'uniformitarian' concept that ancient geological sequences evolved in the same way as modern sequences.

He said the areas examined in China, including those in the northern Tibet Plateau at the zone where two continents collided in the past, represent relatively young examples of some geological environments that are considered important in the geological evolution of the State.

"This helps WA geoscientists to understand ancient rocks in WA, mineral systems and the evolution of mineral deposits and, importantly, residual prospectivity," he said.

GSWA techniques involve an integration of numerous geological disciplines such as geophysics, structural geology, geochemistry and geochronology which ultimately leads to a better understanding of geological evolution that allows for better assessment for prospectivity.

The systems developed by GSWA apply a more holistic and scientific approach to mapping and the survey is recognised as a world leader in digital mapping technology.



SEMINAR OFFERS ADVICE, SUPPORT FOR CHINESE INVESTORS

State Government representatives were in Beijing in September to conduct a seminar for Chinese State Owned Enterprises (SOE) on approval systems in Western Australia.

The WA Government Seminar was hosted by China's State-owned Assets Supervision and Administration Commission (SASAC), and about 90 SOE managers attended.

Department of State Development (DSD) Director General Steve Wood was accompanied on the trip by Environmental Protection Authority (EPA) Chairman Paul Vogel, and John Catlin, Acting Deputy Director General of the Department of Premier and Cabinet.

The seminar focused in particular on environmental protection, land clearance and rehabilitation, native title, and Aboriginal heritage.

Mr Wood said the event was a way to establish an open dialogue with Chinese investors, and to ensure that expectations on both sides were aligned.

"Seminars like this allow for an in-depth appreciation of approvals processes required for major projects, and a better understanding of the operating environment in Western Australia," Mr Wood said.

Dr Vogel outlined the State's Environmental Protection Act, and guided attendees through the process of having a project assessed by the EPA and approved by government.

He said the presentation was well received by attendees.

"Given Western Australia's twin endowments of internationally-acclaimed biodiversity and world class mineral and oil and gas assets, it was important that the Chinese State Owned Enterprises were provided with an understanding of the environmental assessment and approvals process," Dr Vogel said.

Mr Catlin's presentation focussed on land access, including the Native Title system, the Aboriginal Heritage Act and the steps required to obtain land and mineral titles.

"I think Chinese companies want to be assured we have accountable, timely systems in place to manage land and environmental approvals... [and] to know that they can come to the Western Australian Government for clear advice," Mr Catlin said.

While in Beijing, Mr Wood, Dr Vogel and Mr Catlin also conducted a similar seminar for clients of the China Development Bank.

2014 GOLDEN GECKO AWARDS

An in-water hull cleaning system that eradicates bio-fouling of large marine vessels was the winner of the 2014 Golden Gecko award for environmental excellence.

Franmarine Underwater Services and the Department of Fisheries received the award for their collaboration on the Envirocart.

Chair of the Department of Mines and Petroleum Golden Gecko selection committee, Director General Richard Sellers, said this year's recipient excelled across all four assessment criteria.

"The in-water hull cleaning system focuses on prevention rather than cure when it comes to eradicating marine bio-fouling," Mr Sellers said.

"The system promotes a preventative risk-management approach to biosecurity, and a clean-hull operating policy for Western Australian waters.

"The project sets a precedent for in-water hull cleaning, being able to remove marine bio-foulant down to a size of 50 microns, which is well below the industry standards and requirements.

"It is also economically compelling as using the in-water hull cleaning system means ships don't have to travel to Singapore to be dry docked and cleaned potentially saving owners millions of dollars in fuel, labour, dry-docking and lost opportunity costs."

The 2014 Golden Gecko Award was presented by Mines and Petroleum Minister Bill Marmion at the awards ceremony held in Perth in October.

The Golden Gecko Award was accepted by Franmarine Underwater Services General Manager Sam Lane, who explained that the company had previously experienced a taste of the awards when they were involved in a seagrass transplantation project that was awarded a Golden Gecko back in 2000.

"Roger Dyhrberg (Franmarine Managing Director) has had his eye on the Golden Gecko since the Envirocart project began," Mr Lane said.

The company entered the project in the 2013 Golden Gecko Awards and were awarded a Certificate of Merit, which encouraged this year's entry of the Envirocart project.

Mr Lane said the Golden Gecko win gave the company credibility and exposure that would help it make the transition through to the commercial stage of the project.

A Golden Gecko Certificate of Merit was also presented to Geo Oceans Pty Ltd for their project, GO Visions Marine Habitat Mapping and Monitoring Technology.

The GO Visions technology enables rapid assessment and monitoring of large areas of coastal marine habitats following an oil spill.

Mr Sellers said the GO Visions technology made collecting marine habitat data more efficient and accurate.

The diverless subsea technology employed also makes data collection safer.

Anyone interested in submitting a project for the 2015 Golden Gecko Awards should visit www.dmp.wa.gov.au/goldengecko for details.



Sam Lane, Franmarine Underwater Services and Bill Marmion.



Bill Marmion and representatives from Geo Oceans Pty Ltd.

The six finalists for the 2014 Golden Gecko Awards were:

- Argyle Diamonds Limited – Argyle Diamond Mine: Maximising the use of renewable energy at Argyle Diamonds
- Environmental Rehabilitation WA – Mt Ida: Mt Ida magnetite rehabilitation project – Beyond best practice exploration rehabilitation
- Evolution Mining Edna May Operations: Eremophila resinosa translocation program
- Franmarine Underwater Services Pty Ltd and Department of Fisheries: In-water hull cleaning system
- Geo Oceans Pty Ltd: GO Visions marine habitat mapping and monitoring technology
- Newcrest Mining Limited – Telfer Gold Mine: Copper concentrate storage facility

INDUSTRY GETS OPPORTUNITY TO PROVIDE FEEDBACK ON ENVIRONMENTAL REFORM

Reform of environmental regulation was up for discussion at a Department of Mines and Petroleum (DMP) industry briefing session in October.

More than 150 people attended the event where they received updates and were able to provide feedback on a number of DMP's Reforming Environmental Regulation (RER) projects.

The briefing session coincided with the release of a discussion paper on mining proposal reform, one of the key priorities of RER.

Through the RER program, DMP hopes to move away from prescriptive regulation and establish a risk and outcomes-based regulatory framework.

Opening the event, DMP Director General Richard Sellers said the department was working hard to involve industry and community in the reform process so that the recommendations were progressed and implemented in an efficient and well understood manner.

"We have the RER advisory panel and a number of working and reference groups to advise on these proposed changes and make sure that what is put in place is practical and works for industry, while ensuring high level environmental protection," Mr Sellers said.

"In addition to industry members, these advisory panels include representatives from conservation groups, other government departments, local government, and members of the broader community."

Question and answer sessions followed presentations by DMP environmental experts that included current and proposed legislative changes and operational reform, mining proposal reform, and the review of mine closure plan guidelines.

The session ended with a panel discussion that included all presenters and other DMP environment staff who fielded further questions from the audience. The presentation slides from the industry briefing session are now available on the DMP website along with the mining proposal reform discussion paper at www.dmp.wa.gov.au/mining_proposal_reform



DMP Senior Environmental Officer Tyler Sujdovic presenting at the briefing session.

ENVIRONMENTAL OFFSET GUIDELINES RELEASED

New guidelines setting the benchmark for the use of environmental offsets in the assessment and approval of resources projects have been released by the State Government.

The guidelines complement the existing WA Environmental Offsets Policy released in 2011 and public Environmental Offsets Register released in 2013.

Department of Mines and Petroleum Deputy Director General Dr Tim Griffin said the new environmental offset guidelines would provide greater clarity, consistency and accountability for the regulators and industry alike.

"DMP was involved in the development of these guidelines and fully supports their introduction as they will ensure a standard approach across government agencies and help to provide greater transparency and accountability for setting environmental offsets," Dr Griffin said.

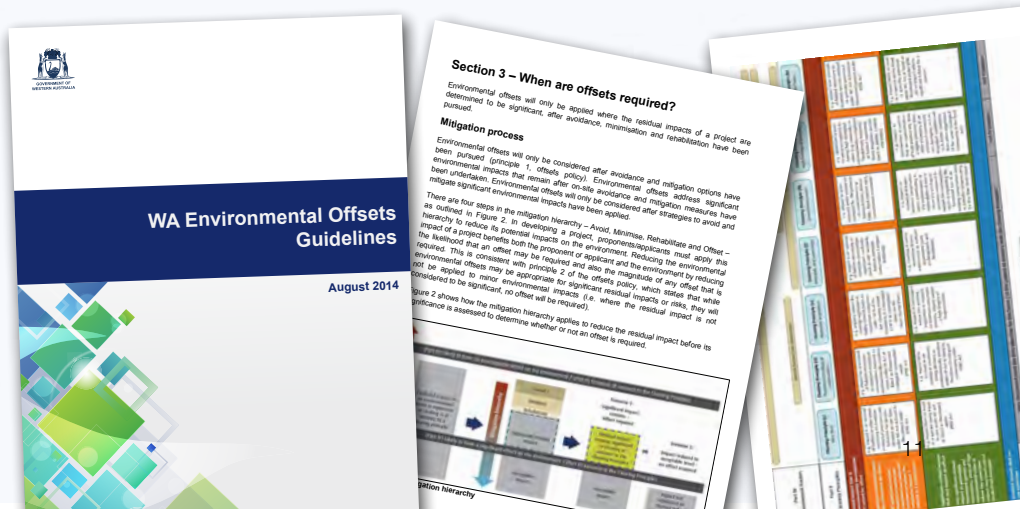
"At the same time they will provide more consistency and certainty for project proponents.

"The guidelines will also provide assurance that environmental offsets are only considered as a last resort and will only be used to complement other approaches designed to reduce or mitigate environmental impacts on biodiversity and environmental values."

Dr Griffin said industry peak bodies and conservation groups were consulted during the development of the guidelines.

He said the release of the guidelines marked another significant step in a series of State Government reforms.

The environmental offsets guidelines can be downloaded from www.dmp.wa.gov.au/environment_policy





*DMP Environment Executive Director
Dr Phil Gorey.*



Western Australia's Mining Rehabilitation Fund (MRF) process has proven to be hugely successful with positive support from industry just six months after becoming compulsory following the initial 12-month voluntary period.

The MRF is a first of its kind policy and WA is the first jurisdiction to implement such a model, either in Australia or overseas.

However, since the MRF's implementation, New South Wales and Queensland have both expressed interest in adopting similar models.

It is also the first time that the Department of Mines and Petroleum (DMP) has implemented a completely online, end-to-end system and the MRF paves the way for future digital transformations at the department.

The uptake by industry has been exceptional. By the 30 June 2014 deadline, more than 95 per cent of eligible tenements had registered for the MRF and submitted their data online.

Despite concerns that prospectors might struggle with an online system, of all the tenement types (Mining Leases, General Purpose Leases, General Purpose Licences, Exploration Capital Licence and Prospecting Licences), the holders of Prospecting Licences achieved the highest submission rates with over 99 per cent of Prospecting Licences submitting their data by the end of June.

Since the closing date, the MRF team have worked with tenement holders so that now more than 99.5 per cent of tenements have had their disturbance and rehabilitation data submitted for the 2013–14 year.

Fewer than 100 outstanding tenements now remain out of approximately 23,000 tenements in Western Australia.

Many of these appear to be due to tenement holders not updating their contact details, with the department currently looking at ways to address this problem.

The incentive for tenement holders to voluntarily enter the fund was the opportunity to have unconditional performance bonds held against their tenements retired early providing the holder met all of the eligibility criteria.

During the voluntary year, DMP retired bonds to eligible holders to the value of A\$290 million and collected voluntary levy payments of A\$6.7 million.

DMP completed the process from data submission to bond retirement in an average of four working days during the voluntary year.

Since 1 July, 97 per cent have been completed within 30 working days, with an average processing time of 13 working days an outstanding achievement considering staff were conducting eligibility checks on around 23,000 tenements.

Since 1 July 2013, over A\$32 million has been paid into the fund and DMP has retired more than A\$829 million of unconditional performance bonds.

At the start of the voluntary period, DMP held unconditional performance bonds worth over A\$1.2 billion and it is hoped that most of the remaining A\$390 million will be able to be retired by the end of the year.

The implementation of the MRF has also enabled DMP to address the complex issue of unconditional performance bonds on dead tenements.

This issue arises when tenements expire or are surrendered or forfeited and an unconditional performance bond continues to be held by DMP.

At the beginning of 2014, almost A\$11 million in unconditional performance bonds were being held for nearly 400 dead tenements in Western Australia.

The MRF team has been systematically investigating all of these tenements and liaising with former tenement holders to determine whether rehabilitation obligations were met and the unconditional performance bonds can be retired.

To date, bonds have been retired or are scheduled to be retired on 205 dead tenements. Another 118 tenements are awaiting a decision as tenement holders complete the rehabilitation and provide rehabilitation reports. Approximately another 50 will be reviewed following further investigation.

More than A\$8 million in unconditional performance bonds associated with dead tenements is in the process of being retired to mining companies and individuals following the implementation of the MRF.

For those dead tenements where rehabilitation has not been completed, DMP will determine whether the unconditional performance bonds should be exercised (called-in).

Prior to the MRF, DMP had no means of funding rehabilitation work on historically abandoned sites, and DMP had not undertaken substantive rehabilitation work on any abandoned mines in Western Australia for decades.

The MRF allows for interest generated by the fund to be used for historical

abandoned mines once they've been gazetted under the *Mining Rehabilitation Fund Act 2012*.

Mines and Petroleum Minister Bill Marmion recently announced the first four sites to be gazetted are Black Diamond in Collie, Elverdton near Ravensthorpe, the ProForce site near Coolgardie, and an abandoned tailings storage facility at Bulong, east of Kalgoorlie.

The four sites were presented to the Mining Rehabilitation Advisory Panel earlier this year for consideration and costing for future rehabilitation and the panel has since recommended all four for gazettal.

Future works on these pilot sites will provide detailed information that will contribute to the review of the MRF that's currently scheduled for 2017.

DMP is currently developing an abandoned mine policy that will provide a framework for the prioritisation of works on abandoned mines.

Getting the data right

Making sure that the right data is provided to DMP through the online MRF system is vitally important for the successful operation of the Mining Rehabilitation Fund.

All eligible tenement holders must provide annually to DMP confirmation of their contact details, and data relating to the extent of environmental disturbance and the extent of land under rehabilitation.

This requirement is in place for a number of reasons, most importantly:

1. The *Mining Rehabilitation Fund Act 2012* requires that all tenement holders provide an annual report, even in instances where there is no current environmental disturbance on the tenement.
2. This compulsory reporting enabled DMP to implement the recent changes to the validity term for Programmes of Work (from one year to four years) as industry operators would be providing the necessary information about whether disturbance and rehabilitation has taken place on a tenement on an annual basis.
3. DMP has had feedback from concerned stakeholders that some tenement holders appear to retain tenements with no intention to explore or mine them; this is known as 'land banking' or 'real-estating'. The collection of annual disturbance information will enable DMP to accurately determine if and where this practice is occurring.

4. The implementation of the MRF has highlighted that there is a need to ensure tenement holder contact details are regularly confirmed. Failing to do this not only exposes the tenement holder, it also means that DMP cannot contact the tenement holder to keep them informed of matters relating to their tenement. The MRF process allows this confirmation of contact details to occur.

The compulsory submission of annual data will also help inform DMP of emerging issues relating to industry activity.

For instance, if a region, commodity type, or area is reporting that no disturbance is occurring for extended periods, this will provide valuable industry trends which will help DMP gauge if the industry is facing particular challenges that require government consideration.

In recognising this importance, DMP has continued to develop the MRF systems and processes so that the necessary information can be submitted by tenement holders in the most efficient way.

The most significant step has been the use of online computer submission systems instead of hardcopy submissions.

The mandatory use of online lodgement has been critical in avoiding delays and errors which often result from the use of hardcopy forms. The fact that tenement holders were able to complete the data submission for more than 95 per cent of all eligible tenements by 30 June indicates that the system was intuitive and robust.

Since the introduction of the MRF online lodgement system, DMP has implemented a range of enhancements arising from tenement holder feedback that are aimed at improving the ease of submitting accurate annual data. These include:

- Reducing the duplication between AER and MRF online lodgements.
- Using previous year's data as the basis for future year submissions.
- Simplifying lodgement where there is no change to details.

As further feedback is received from tenement holders, DMP will continue to look at opportunities to improve the functionality of the online system.

Potential enhancements that have already been identified, which the department will be seeking feedback on from tenement holders, include:

- The addition of new land types in the MRF lodgement system.

- Combining Form 5 reporting obligations into the MRF online system.
- Producing an online MRF calculator to allow estimation of future levy payment amounts.
- Allowing the automatic transfer of data between Programme of Work and MRF reports.
- Removing the requirement for tenement holders whose tenements are due for renewal in the next 12 months to confirm their intention to renew.

The decision to implement future enhancements will be based on a cost-benefit analysis, and timing will depend on the complexity of any changes.

The MRF team plans to send correspondence to all tenement holders seeking their views on the above suggestions, and also asking for suggestions about any other enhancements they think DMP should consider.

The first year of ground disturbance and rehabilitation data collected under the MRF was released recently and can be downloaded from the DMP website.

This data shows the amount of land disturbed in a given year by exploration and mining companies operating under the Mining Act, and the amount that is under rehabilitation.

From research undertaken by DMP, this dataset is the most accessible, comprehensive and accurate public release of mining and rehabilitation data available anywhere in Australia.

The data is available for users to filter and search by region, type of disturbances, and type of lease, and information such as the total area of land currently under rehabilitation can be extracted.

Making this disturbance and rehabilitation data available to the public improves transparency and will assist industry conduct research on tenements. This includes assisting prospective tenement purchasers of assets and environmental liabilities associated with tenements.

While this is just the first year of data collected during the MRF's operation, as the years progress, DMP will be able to build on this picture and compare ground disturbance over time.

DMP HAILED AS ONE OF WORLD'S BEST REGULATORS



*Minerals and energy law expert
Dr Tina Hunter.*

Minerals and energy law expert Dr Tina Hunter has identified the Department of Mines and Petroleum (DMP) as one of the three best regulatory organisations in the world.

Dr Hunter made the comments when asked if she believed DMP had taken seriously her recommendations made in a review she was commissioned to undertake in 2011 relating to shale and tight gas activities in Western Australia.

She said WA's DMP was one of only three regulators worldwide – the other two being South Australia and DECC (the Department of Energy and Climate Change) in the UK – that she recognised as a comprehensive and competent regulator.

"In my view they are professional and have the necessary experience and processes to implement best practice in the regulation of unconventional natural gas," she said.

Dr Hunter dismissed the suggestion that DMP could have a conflict of interest in enforcing regulations for an industry it 'subsidised'.

"DMP does not subsidise the industry," she said.

"The State Government has several roles as owner of the resources, regulator, granter of access to the resource and the body that collects revenue.

"This inherently creates conflict for any government agency, not DMP in particular."

Asked if she believed new resource management regulations being introduced by DMP were adequate, Dr Hunter said she had been heavily involved in the drafting and that they represented good practice.

"As you would have seen in my report, the DMP is a fine regulator that needs laws to support it," she said.

"The laws that have been drafted and are being implemented will give the regulator the necessary tools to effectively regulate petroleum activities in WA."

Dr Hunter said that she believed it was essential that the State Government should be the regulator of the industry.

"But it is also essential that the regulator builds competency and is as competent as the companies it is regulating," she said

"DMP is exceptionally competent."

Dr Hunter is the inaugural Director of the Centre for International Minerals and Energy Law and teaches at the University of Queensland.

An Honorary Research Fellow at the University of Aberdeen, Scotland, Dr Hunter has consulted to governments, industry groups and NGO's in several jurisdictions including Australia, New Zealand, the UK, Russia and Canada.

DMP OFFICER WINS TOP ACADEMIC HONOUR



Carolyn is presented with her award by mapping and surveying company Whelans State Surveying Manager Wayne Stewart.

Twin passions for scuba diving and geospatial science combined to help Department of Mines and Petroleum (DMP) officer Carolyn Martin win one of Western Australia's most prestigious academic honours.

Carolyn's project on photogrammetric mapping of underwater shipwrecks won her the Postgraduate Student Award at the 2014 WA Spatial Excellence Awards held in September at the University of WA.

She was judged by peers to have achieved professional excellence in a research project that advances the surveying and spatial field.

As part of her project she proved that the popular GoPro camera provided better photogrammetric results than much more expensive and bulky Digital Single Lens Reflex (DSLR) cameras.

DMP DIRECTOR GENERAL HONoured WITH PRESTIGIOUS FELLOWSHIP AWARD

Department of Mines and Petroleum Director General Richard Sellers has been acknowledged with the prestigious National Fellow Award from the Institute of Public Administration of Australia (IPAA).

The award recognises his outstanding contribution to the practice and study of public administration.

The IPAA award is the highest accolade for members and has only been awarded to 200 recipients in the past 30 years.

Mr Sellers said it was humbling to be among the calibre of people who had been the past recipients of this award.

"I have been working with the IPAA over a number of years and I value the contribution it plays to development and support of the public sector," he said.

"This success is only possible with the support and dedication of a team of hard working people at the Department of Mines and Petroleum and I am a lucky person to have the support from those who work in the organisation."

During the five years since his appointment as DMP Director General, Mr Sellers has implemented significant reforms and



DMP Director General Richard Sellers, left, being presented with his award from IPAA President Terry Moran.

innovations that have enhanced regulatory performance and service delivery across WA's resources sector.

The fellowship award was presented at a gala dinner on 30 October at the Perth Convention Centre.

In June this year, Mr Sellers was also awarded the IPAA Patrons Award, the highest WA award presented to an individual who has made a significant contribution to the State.

"It is cheaper, simpler, and was able to capture larger datasets more efficiently," Carolyn said.

"It was particularly rewarding after being told by several academics that the camera wouldn't work and then being able to prove that it did."

As a result, the camera will now be one of the photogrammetric tools used as part of the HMAS Sydney Project to capture high-resolution 3D stereoscopic images of the wrecks of the famous Australian cruiser and her nemesis, the German raider Kormoran.

Both ships sank off the Western Australia coast in World War II after a fierce naval battle in 1941.

The WA Spatial Excellence Awards could be described as the 'Oscars' of the geospatial industry and are co-hosted by the Survey and Spatial Sciences Institute (SSSI) and Spatial Industries Business Association (SIBA).

SSSI is the primary national body catering for spatial information industry professionals and SIBA is the industry's peak representative body for Australia and New Zealand.

Both of DMP's premier spatial systems – TENGRAPH and GeoVIEW.WA – have previously won spatial system excellence awards from SSSI and SIBA.

The winner of each state's Postgraduate Student Award is automatically nominated for the national award, which will be presented in Brisbane next March as part of the Locate 2015 conference.

This means Carolyn is in line for national prominence in her chosen field.

She has also chalked up another important achievement in her career, when she completed a demanding 18 months of combined work and study to be awarded last month with her Masters in Geospatial Science from Curtin University.

"It was really, really hard to study and work at the same time, but the study leave helped a lot," Carolyn said.

The award and her Masters are two rewarding milestones on a career path that started back in 2001 at the front desk of the Department of Mines and Energy in Darwin.

"I had just started there and was working at the front counter for one week before someone said 'you seem to be pretty cluey about mapping, how'd you like to be a charting officer?'" Carolyn recalled.

It was the beginning of a career that next took her to the Department of Natural Resources and Mines in Queensland and now DMP, where she has worked for about four years.

Carolyn said that her time in the department had been the most rewarding in her career.

"The people I work with are great," she said. "The camaraderie is brilliant and I really value the support I have been given."

INDUSTRY REMINDED OF ASBESTOS DANGERS

There are many aspects of a mining operation that have the potential to harm workers.

Some risks are obvious. Working with cranes, heavy mining machinery or industrial-scale processing equipment all present well-known risks.

However, others are less visible. In fact, some hazards can't even be detected by the naked eye, but they still have the potential to harm.

Although you may not be able to see them, the danger presented by many fibrous minerals is very real.

Hazardous fibrous minerals can attach themselves to the lungs when breathed in.

"This can lead to asbestosis, lung cancer, mesothelioma and pleural plaques," Department of Mines and Petroleum Resources Safety Executive Director Simon Ridge said.

There have always been naturally occurring asbestos minerals in some ore bodies in Western Australia.

"However, like with any hazard – it doesn't need to equal harm, that only happens when you are exposed," Mr Ridge said.

"This is why the department provides guidance on how to reduce the risks and protect the health and safety of workers.

"The State's management of fibrous minerals provides a good example of how the risks can be reduced."

Over the past decade, the level of mining activity in Western Australia has increased significantly.

"However, this increase in activity means fibrous minerals are now encountered in mining operations more frequently than they were in the past," Mr Ridge said.

"This is why employers have a duty to ensure the risk of workers being exposed is minimised.

"Achieving this requires appropriate strategies to recognise, evaluate and control these hazards."

The development of a fibrous minerals management plan is an important part of this process.

The plan outlines how an employer is addressing the risks and minimising the potential exposure to its workforce.

Mr Ridge said it was particularly important to ensure all workers are aware of their site's fibrous minerals management plan.

"There's no use having a plan if workers aren't aware of it or don't adhere to it," he said.

Humans breathe in an average of about 25,000,000 fibres in their lifetime, but fortunately not all of these are dangerous.

"It is the employers' duty to ensure exposure of workers to airborne fibrous minerals is within regulatory standards," Mr Ridge said.

"And it is the workers' right to know about hazards within the workplace, and to have access to information and training.

"This means that workers will not only better understand the risks around them, but also why certain safety measures are in place.

"Workers also have a responsibility to then follow the plans and use the appropriate procedures and equipment to ensure their own and other workers' safety."

As part of DMP's efforts to ensure companies and workers are well aware of the risks and measures to mitigate them, the Resources Safety Division has held special workshops as part of touring safety roadshows.

More information, including guidelines, can be found at www.dmp.wa.gov.au/Fibrous



Looking for fibrous minerals, such as asbestos, in a banded iron sample.



GROUNDWORK LAID FOR LNG 18

The leading industry forum for LNG professionals is taking shape as preparations get underway for the LNG 18 International Conference and Exhibition to be held in Perth in 2016.

Highlighting Western Australia's position as the home of LNG in Australia, LNG 18 will run from 11 to 15 April 2016 at the Perth Convention and Exhibition Centre and is expected to inject an estimated A\$50 million into the State's economy.

Western Australia currently has A\$127 billion worth of LNG projects either committed or under construction, with estimates predicting Australia will become the world's largest exporter of LNG within a decade.

In 2013, Western Australia produced 82 per cent of Australia's total LNG, and the State's sales rose 16 per cent to A\$14 billion in the financial year 2013–14.

Without question, it's an exciting time to be involved in the LNG industry, and LNG 18 in Perth is recognition of the city's lofty global reputation as a business centre for the energy sector.

The LNG 18 program theme – Redrawing the Global Map of Gas – highlights the changing landscape of natural gas. During the conference, participants will have the opportunity to learn about, influence and make decisions for the LNG industry.

Dr Nirmal Chatterjee will once again steer the LNG 18 conference program, drawing on his experience over the last six events to deliver an informative and refreshing range of session topics. The National Organising Committee is working with the international Program Committee to complement the conference program with a number of plenary sessions headed by industry leaders.

"We, the 45-member Program Committee representing 35 companies from 15 countries, are committed to developing a program that will attract more than 5,000 participants and 250 exhibitors to Perth," said Dr Chatterjee.

"We plan to cover the entire LNG chain, and to attract more regional and first-time delegates we will emphasise topics of special interest to the Asia-Pacific

region. We'll also look at the next frontier of the industry, focusing on pioneering breakthroughs and new applications."

LNG 18 participants will benefit from accessing the latest products and services showcased by exhibitors and will be able to network during social functions, corporate events and technical tours.

In addition, extensive media will be present and numerous sightseeing opportunities that showcase the best of the State will be on offer. Accommodation options are varied and conference organisers have already secured a significant number of hotel rooms on behalf of attendees.

If you are interested in attending LNG 18, registrations will open in March 2015 online at www.lng18.org

The call for paper submissions is now open and closes on 20 April 2015.



LNG 18

18th International
Conference & Exhibition on
Liquefied Natural Gas

Perth | Australia | 11–15 April 2016

A DECADE OF MINES SAFETY ROADSHOWS

A lot can happen in 10 years.

Back in 2005 there were about 45,000 people working in the State's mining industry.

The minerals and energy sector was worth about A\$39 billion and iron ore had just overtaken crude oil and condensate as WA's most valuable commodity.

A decade later and there are more than 100,000 people working in the industry. The minerals and energy sector is now worth more than A\$121 billion, and iron ore has dramatically increased its dominance as the State's most valuable commodity.

Just as these indicators have grown, so too has the popularity of the Department of Mines and Petroleum's Mines Safety Roadshow.

"Certainly the popularity of the roadshows has grown significantly over the past decade," Mines Safety Director Andrew Chaplyn said.

"The roadshows criss-crossed the State during the month of October, which is Safe Work Australia Month, and featured the highest attendance figures yet.

"We had about 650 people attend the eight roadshows held across Western Australia."

Mr Chaplyn said the event was designed around a simple question – what can we do to help improve safety in Western Australia's mining industry?

"The first roadshow was held back in 2005 and while the event may have grown significantly in the 10 years since, the key question remains the same," Mr Chaplyn said.

"It will always be relevant because safety evolves," he said.

"Whether we are looking at safety from an industry perspective, or safety from a regulator's perspective, there will always be improvements we can make.

"It is our passion to improve mining safety that drives us as an inspectorate and the Mines Safety Roadshow really allows us to highlight important, topical issues that can affect industry outcomes."

This year's roadshow included special screenings of a new series of hazard awareness videos.



KNOWING YOUR HAZARDS

The ability to correctly identify potential hazards in the workplace can be critical in reducing the severity and frequency of workplace accidents and incidents.

It was with this in mind that the Department of Mines and Petroleum's (DMP) Resources Safety Division developed the 'Know Your Hazards' video series.

DMP Resources Safety Executive Director Simon Ridge said the first instalment of videos focused on improving lifting and rigging practices.

"If hazards are not recognised or understood, supervisors and workers will not be taking appropriate precautions to eliminate them or reduce the risks," Mr Ridge said.

"This is why we have initiated a series of short educational videos to assist workers to understand the concepts behind some common hazards encountered in the resources industry."

The first series of videos has been titled 'Raising the Issues' and looks at incorrect lifting and rigging practices.

"These are issues that have caused a number of fatalities, serious accidents and near misses in recent years," Mr Ridge said.

Mines and Petroleum Minister Bill Marmion launched the videos at Western Australia's world-class underground mine training centre The Cut, run by the Central Institute of Technology.

"To protect yourself from harm you must know what can harm you, and these videos provide key pointers on the basics of friction, tensile strength and centre of gravity," Mr Marmion said.

The videos were screened across Western Australia as a part of DMP's annual Mines Safety Roadshows and are freely available online.

The videos can be accessed at www.dmp.wa.gov.au/HazardVideos



Mines and Petroleum Minister Bill Marmion.

NEW STATE-WIDE DIGITAL MAP TO ASSIST EXPLORERS

A new seamless, State-wide Interpreted Bedrock Geology digital map is set to provide a more accurate backdrop for resources exploration.

Developed by the Department of Mines and Petroleum's (DMP) Geological Survey of Western Australia (GSWA), the 1:500,000 scale map will form the base layer for future GSWA maps and spatial products.

These new special maps will give explorers a consistent summary of the geology of Western Australia and will also become the base layer for many of DMP's spatial databases.

The up-to-date geological framework will provide a more accurate backdrop for exploration that will allow geologists to show the geological framework, or building blocks, of the State.

GSWA Executive Director Dr Rick Rogerson said as well as being more accurate spatially, more information about each map unit than ever before is included.

"This will provide a wealth of additional information which will be of great assistance to explorers and geologists," he said.

The 1:500,000 interpreted bedrock geology map is a complete reinterpretation and update based on GSWA mapping since 2000, and is the culmination of a decade's work and a new understanding of the geology of Western Australia.

"It is a set of intelligent spatial layers, rather than a single map and includes interpreted bedrock faults and folds and areas of significant Cenozoic deposits, a separate layer of rocks less than 65 million years old," Dr Rogerson said.

"The layers aim to illustrate the regional geological framework of Western Australia in as much detail as possible at this scale, rather than being simply a standalone map."

The lookup table for the main interpreted bedrock geology layer is sorted using tectonic subdivisions first and then age, providing the digital equivalent of a map legend.

"As well, the recent geophysical datasets acquired as part of the State Government's Exploration Incentive Scheme (EIS) have been used extensively in generating the map," Dr Rogerson said.

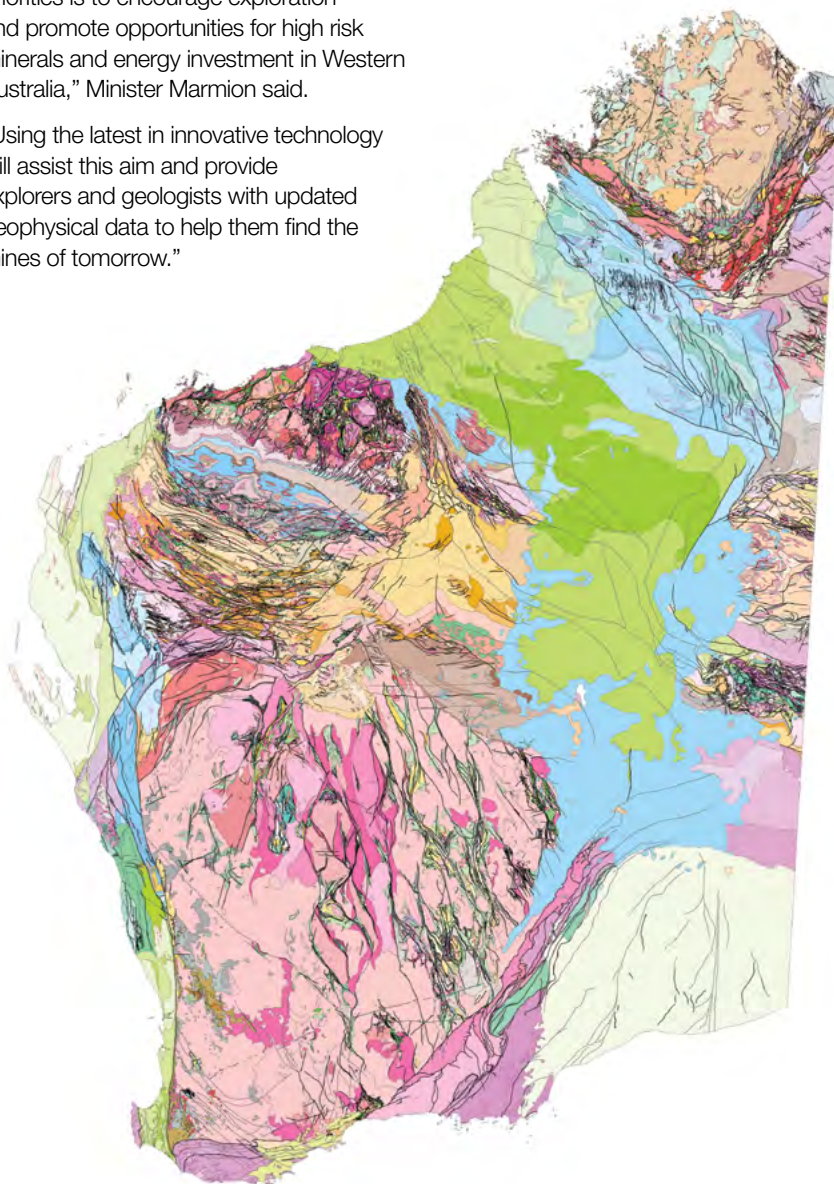
Mines and Petroleum Minister Bill Marmion, who launched the map earlier in December 2014, said updates were already planned and would be released incrementally as more information becomes available.

"One of the State Government's highest priorities is to encourage exploration and promote opportunities for high risk minerals and energy investment in Western Australia," Minister Marmion said.

"Using the latest in innovative technology will assist this aim and provide explorers and geologists with updated geophysical data to help them find the mines of tomorrow."

He said spatial layers at 1:2,500,000 scale, including geological polygons, structures and tectonic divisions, were the next target resulting in a new, revised State Geological Map — the first since 1998, and the first compiled entirely digitally.

The 1:500,000 scale layers and associated lookup tables are available as a download from the department's Data and Software Centre at www.dmp.wa.gov.au/data_software_Centre





PILBARA IRON ORE IS KEY TO LONG TERM GROWTH

The latest quarterly outlook by Australia's commodities forecaster identifies the importance of the Pilbara region's iron ore companies to the long-term growth of Australia's economy.

According to the Bureau of Resources and Energy Economics (BREE), in 2013–2014 Australia's iron ore export volumes increased by 24 per cent to 652 million tonnes.

The rise in exports was supported by record production from Pilbara mines and Rio Tinto, BHP Billiton and Fortescue Metals Group all posted record high shipments.

BREE reported export values had increased 31 per cent to A\$74.8 billion in 2013–2014 and this was underpinned by a combination of higher volumes, a more favourable exchange rate and higher prices in the first half of the financial year.

BREE forecasted Australia's iron ore exports would grow by 8.6 per cent to 768 million tonnes in 2015.

A large part of this increase would be the result of the opening and development to full production of Hancock Prospecting's Roy Hill project.

The project is expected to begin operations in late 2015 and is expected to produce 55 million tonnes a year of high grade iron ore at capacity.

The commodities forecaster believes Australia's iron ore exports will grow over the next five years at an average annual rate of five per cent, reaching a total of 900 million tonnes in 2019.

BREE reports that Rio Tinto, BHP Billiton and Fortescue Metals Group were all projected to deliver further production increases as they moved to reduce the fixed overhead costs of their established infrastructure networks by increasing volumes transported on them.

DIRECTOR GENERAL TALKS REFORM AT NICKEL CONFERENCE



Department of Mines and Petroleum Director General Richard Sellers.

Ongoing reforms and the importance of continued consultation were the main themes of Department of Mines and Petroleum Director General Richard Sellers' opening address at the Paydirt 2014 Australian Nickel Conference in October.

Mr Sellers said in his speech that it was essential current reforms within the sector continued in close consultation with stakeholders.

He highlighted the work in approval reforms as a major achievement.

"Since the introduction of our approval reforms, we have cut the backlog of outstanding mineral title applications from more than 18,000 in 2007 to just over 4000 today – the lowest level in two decades," Mr Sellers said.

"This will reduce even further under our current push to expand the existing approvals transparency to other related government agencies including Aboriginal Affairs, Water, Environment Regulation, the Environmental Protection Authority and Parks and Wildlife."

Mr Sellers said he could not stress strongly enough the importance of consultation in shaping WA's resources future.

"Resource projects are being developed in an increasingly complex and challenging social and community environment," Mr Sellers said.

"This environment demands that industry has greater environmental, economic and social accountability which in itself highlights the importance of transparent decision making and community engagement for the successful delivery of new projects.

"The challenge Western Australia now faces, is the ability to sustain growth of the resources sector and remain an attractive investment destination and that includes agencies such as ours helping build confidence with stakeholders and the community."

He said the value of Western Australia's resources in 2013–14 was a record A\$121.6 billion with nickel coming in as the State's fourth most valuable mineral sector at A\$3.5 billion.

For the first half of that year, US dollar prices negatively impacted the sector but a combination of rising prices and the weakening Australian dollar resulted in an increased price of about two per cent for nickel producers in 2013–14.

In the same period, the quantity of WA nickel sales fell by nine per cent to 209,000 tonnes, while the total value fell by four per cent.

However, nickel has benefited from the State's Exploration Incentive Scheme (EIS) established in 2009.

In that time, the scheme's flagship Co-funded Exploration Drilling Program has offered more than A\$50 million to over 460 resources projects in Western Australia.

In 2013–14, there were 33 nickel discoveries across the State – part of a total of 271 projects where nickel or base metals are being targeted.



Drill core from the Nova Nickel Project. Photo: Nova

RECORD APPROVAL TIME FOR NOVA DISCOVERY

Western Australia's improved approvals processes will help boost the likelihood of the Sirius Resources Nova project in the Fraser Range commencing as early as 2015.

"Since the greenfields nickel, copper and cobalt deposit discovery the Department of Mines and Petroleum's (DMP) Mineral Titles Division has worked closely with the company to ensure the minimum time possible to grant a Mining Lease for the project," DMP Director General Richard Sellers said.

He said the Mineral Titles Division had pulled out all the stops to process the application in 25 business days, rather than the target period of 65 days, due to the significance of the discovery.

"The department continues to work to reduce the time taken for approvals, and this Mining Lease has benefited from the introduction of electronic processing of applications," Mr Sellers said.

DMP's Geological Survey of Western Australia (GSWA) provided geophysical and geochemical data that assisted in the discovery, while the first diamond drillhole at Nova received co-funding under the Exploration Incentive Scheme (EIS) scheme.

Sirius' Managing Director Mark Bennett applauded the efforts of the department to expedite the granting of the Mining Lease just nine business days after the signing of a Mining Access Agreement with the traditional owners.

He said this was another important milestone in the company's path to creating the best nickel mine in Australia.

"I would like to acknowledge the efforts of the staff of DMP who have made this process so efficient, and also the goodwill shown by the department and the Minister for Mines and Petroleum Bill Marmion throughout the past two years," Mr Bennett said.

"We are in the final stages of permitting and project financing for the Nova Nickel project and, subject to completing these successfully, aim to start development in early 2015. At the same time we continue to progress our exploration program throughout our Fraser Range and Polar Bear projects."

Since its inception in 2009, the EIS Co-funded Drilling Program has offered almost A\$50 million in grants to more than 460 exploration drilling projects.

The State Government's commitment to explorers under the EIS is expected to reach about A\$130 million by 2016–17.

Up to A\$5 million will be made available through Round 10 of the Co-funded Drilling Program to suitable projects to provide incentives to drill in underexplored areas during 2015.

IMPRESSIVE THIRD QUARTER APPROVALS PERFORMANCE

Continued strong performance across a number of key approval processes have been identified in the Department of Mines and Petroleum's (DMP) September quarter approvals performance report.

The report shows the majority of key approvals were addressed within target timelines.

DMP Executive Director Strategic Projects Julie de Jong said the latest quarterly figures were pleasing given the increased number of applications received in several categories.

"This an extremely pleasing result considering the department received 1009 mineral tenure applications, 477 Program of Work exploration applications and 60 Mining Proposals during the quarter," Mrs de Jong said.

The department's Mineral Titles Division finalised 97 per cent of mineral exploration licence applications and 98 per cent of prospecting licences within the 65 business day target.

"A higher number of mineral tenure applications are usually received in the third quarter of the year, so to have maintained or increased the percentage of applications finalised within timeline targets in many categories is a credit to the teams involved," Mrs de Jong said.

Of exploration and mining applications, 96 per cent of Program of Work applications and 90 per cent of Mining Proposals were finalised within the target of 30 business days.

DMP's Environment Division received 62 native vegetation clearing permit applications during the quarter, of which 86 per cent were finalised within the target timeline of 60 calendar days.

The Resources Safety Division received 14 Project Management Plans (PMPs) during the September quarter and all PMPs were finalised within the 30 business day target.

Of petroleum tenure and activity applications, 35 Joint Authority Assessments were received with 79 per cent finalised within the 20 business day target.

One hundred per cent of Well Applications were finalised within the 40 business day target with 37 applications received during the quarter.

Five petroleum Exploration Permit applications were received, however only 11 per cent of Exploration Permits were finalised within the 120 business day target during the September quarter.

Ninety six per cent of Environment and Oil Spill Contingency Plans were finalised within the target of 30 business days and 100 per cent of Petroleum Safety Cases were finalised within target.

"The department has previously reported on key petroleum approval processes," Mrs de Jong said.

"Following a review of petroleum approval processes and work programs, we've decided to include three additional approval sub categories in the report.

"These sub categories are Joint Authority Assessments, Other Approvals and Other Titles.

"A detailed list of sub category application types is provided with this report.

"While we're performing well in many categories there are some areas, particularly Exploration Permits approvals, where the department is working to improve performance."

DMP APPROVALS PERFORMANCE - THIRD QUARTER 2014 (July - September)

The table below provides information regarding the number of mining and petroleum applications received during the specified period, DMP timeline target, approval performance measures and number of applications finalised within target timelines. The timeline target applies to processes completely finalised while additional information is being sought from applicants.

	Timeline target (business days)	No. carried over from previous quarter	No. applications received	Total No. applications	No. referred, lapsed, rejected or withdrawn	Total no. finalised within timeline target
Tenure applications						
Prospecting Licences	65	205	329	192	44	188
Exploration Licences	65	66	580	6	278	583
Minerals Sector						
Mineral Exploration Licences	65	152	22	37	7	35
Mineral Exploration Licences	65	181	22	16	14	4
Mineral Exploration Licences	65	357	78	52	6	4
Mineral Exploration Licences	65	95				
Mineral Exploration Licences	65	270	577	613	34	188
Mineral Exploration Licences	65	107	60	77	3	3
Mineral Exploration Licences	65	46	82	63	3	3
Mineral Exploration Licences	65	30	8	14	11	2
Mineral Exploration Licences	65	30	4	6	6	2
Mineral Exploration Licences	65	30	4	6	6	2

Approvals Performance Report (July - September 2014)

The approval performance target for the department is to achieve greater than 80 per cent of applications finalised within the target timeline.

During the September quarter 2014, the Department of Mines and Petroleum (DMP) finalised the majority of key approval processes within the target timelines.

The department received a total of 1009 mineral tenure applications comprising 580 Exploration Licences, 329 Prospecting Licences, 67 Miscellaneous Licences, 22 Mining Leases, 2 Retention Licences and 9 General Purpose Licences. The department finalised 97 per cent of mineral exploration licence applications and 98 per cent of prospecting licences within the timeline target of 65 business days.

DMP received 577 Programme of Work exploration applications and 60 Mining Proposals. Ninety-six per cent of Programme of Work applications and 90 per cent of Mining Proposals were finalised within the timeline target of 30 business days. Sixty-two native vegetation clearing permit applications were received by the department during this quarter. Eighty-six per cent of clearing permit applications were finalised within the target timeline of 60 calendar days.

The department received 14 mine safety Project Management Plans (PMPs) and 6 Radiation Management Plans (RMPs) during the September quarter. One hundred per cent of PMPs and 83 per cent of RMPs were finalised within the target timeline of 30 business days.

During the September quarter, six new and revised safety case, safety management system, diving safety and pipeline management plans were accepted by the department. One hundred per cent were accepted within the statutory timelines.

The department, as part of a review of petroleum approval processes, has assessed and decided to report on a number of application types not previously reported on.

Three new application categories have been added. They are Joint Authority Assessments, Other Approvals and Other Titles. Other Approvals include application types such as Declaration/Revocation of Location, Extension of Title Term and Suspension of Permit Rights. Other Titles include Access Authority Applications, Drilling Reservation Applications and Special Prospecting Authority Applications. A detailed list of application types can be found on the DMP website located under Approvals/Approvals Reporting. These changes to reporting are effective 1 July 2014.

The department received 35 Joint Authority Assessments, 12 Other Approvals, 5 Exploration Permit applications and renewals, 2 Pipeline Licence applications and variations, 5 Survey and 37 Well Applications. Seventy-nine per cent of Joint Authority Assessments were finalised within 20 business days. Eighty per cent of survey applications and 100 per cent of well applications were finalised within 40 business days. Only 11% of Petroleum Permit applications were finalised within the target timeframe. The department is working to improve Exploration Permit approval performance.

A total of 97 Petroleum Environment applications were received for planned petroleum activities in the State. Ninety-six per cent of Petroleum Environment applications were finalised within the target timeline.

Petroleum environmental and safety applications

	Target Timeline (business days)	No. carried over from previous quarter	No. applications received	Total number finalised	No. referred, rejected or withdrawn
Joint Authority Assessments	20	72	35	57	2
Other Approvals	120	75	5	2	4
Other Titles	120	7	2	1	0
Exploration Permits	90	5	0	0	0
Other Approvals	90	9	0	0	0
Other Titles	90	5	12	22	7
Exploration Permits	40	52	5	10	0
Other Approvals	40	15	4	27	0
Other Titles	40	4	37	27	0

Environmental Plans

	Target Timeline (business days)	No. carried over from previous quarter	No. applications received	Total number finalised	No. referred, rejected or withdrawn
Environmental Plans	30	58	97	112	4
New Safety Cases/SMS	30*	0	2	2	0
Revised Safety Cases/SMS	30*	0	4	4	0

Note 1: * Denotes calendar days instead of business days.
Note 2: Effective 1 July 2014, Petroleum Tenure and Activity applications include additional categories of

www.dmp.wa.gov.au



MODERNISING WA'S SAFETY LEGISLATION

The State Government's next step in modernising Western Australia's resources industry safety legislation was announced in August this year.

In his announcement, Mines and Petroleum Minister Bill Marmion said the new legislation was an important step in further reducing the risk of harm in WA's resources industry.

"The intention is to place a greater focus on risk management and to be less prescriptive," Mr Marmion said.

"The onus will be placed on industry to demonstrate they understand the hazards and have control measures in place."

Department of Mines and Petroleum Resources Safety Division Executive Director Simon Ridge said the new changes would modernise and harmonise the State's mine safety regulation with other jurisdictions.

"The Bill will initially cover mines safety, replacing the *Mines Safety and Inspection Act 1994*," Mr Ridge said.

"The new mines safety legislation will incorporate the best elements of the nationally-developed model Work Health and Safety legislation and the National Mine Safety Framework.

"However, it is also important to recognise that some aspects that work in other jurisdictions may not apply to WA.

"Aspects of the model laws that don't suit the WA context will be amended or removed altogether."

The proposed changes will also look at the possibility of the current legislative structure covering mining, petroleum and major hazard facilities.

"With legislation for all three areas undergoing reform, there is an opportunity to review the legislative structure and consider consolidation of the current Acts and Regulations," Mr Ridge said.

"The department has started consultation on five options that outline how we can structure the legislation.

"These options range from consolidating all resources safety elements into one unified Act, partially consolidating the current safety acts or leaving the Acts as they are."

Legislated safety obligations for industries in the resources sector are currently contained within six different parliamentary acts and associated regulations.

Mr Ridge said the initial focus of the consultation was only on the structure of the Acts.

"This is one of the first steps as we look to reform safety legislation in WA's resources industry," he said.

"Once this has been finalised, we will then consult separately on proposed changes to the content of the legislation."

Mr Ridge said a Ministerial Advisory Panel on Safety Legislation Reform was established with industry and the unions to ensure appropriate input into the decision-making process.

"The panel has met five times since it was established in January 2014, making recommendations to the department and the Minister on the development and implementation of the reforms," he said.

The Work Health and Safety (WHS) legislation for general industry was released for comment in October.

Commerce Minister Michael Mischin released the Work Health and Safety 'Green Bill' (Consultation Bill) which is open for consultation until 30 January 2015.

"Our Ministerial Advisory Panel will also monitor progress of the Green Bill, to ensure alignment between WHS legislation for resources and other industries," Mr Ridge said.

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GLOBAL SAFETY EXPERTS IN PERTH

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ISO Technical Committee Chairman Dan Roley launched the workshop with Mines and Petroleum Minister Bill Marmion at BHP Billiton Iron Ore's Integrated Remote Operations Centre.

Development of global safety standards for autonomous mining machinery was the focus of discussion at a recent Perth workshop attended by international expert Dan Roley from the International Organisation of Standardisation (ISO).

Dr Mr Roley, who chairs the ISO technical committee on mobile autonomous mining systems, spoke at the workshop hosted by the Department of Mines and Petroleum (DMP) and the Chamber of Minerals and Energy WA (CMEWA) in September this year.

"The workshop offered a good opportunity to have input from Australian experts as we develop these global safety standards," Dr Roley said.

The ISO technical committee also held a working group meeting on September 18 and 19.

"The technical committee develops commercial and safety standards for machines used in earth-moving, mining, and general construction," Dr Roley said.

"We continually develop new standards and revise current standards to address new types of machines, new applications and new technology.

"The ISO standards are developed with cooperation between machine users, health and safety organisations, and manufacturers to achieve the common goal of developing machines that can be used safely."

DMP's Director Mines Safety Andrew Chaplyn said the workshop provided input into the ISO standards.

"Our State is the first jurisdiction in the world to develop safety guidance covering autonomous equipment in the mining industry," Mr Chaplyn said.

"Western Australia is at the forefront in the use of this technology, so it makes sense that we provide input into the development of the ISO standards from a regulator and operator's perspective.

"The guidance documents were developed by a team comprising representatives

from equipment manufacturers, mining companies, technology experts, as well as the regulator.

"With ISO holding its working group meeting here in Perth, we have an opportunity to liaise with international experts in the field and, if necessary, revise the guidance to ensure the best safety outcomes for the industry in WA."

Mines and Petroleum Minister Bill Marmion said he was honoured to see an international organisation like ISO in Western Australia listening to our regulators and industry.

"For more than 65 years, ISO has been developing safety standards that apply to industries around the world," Mr Marmion said.

Mr Marmion said the decision to hold the event in Perth was evidence of Western Australia's globally recognised expertise in the resources industry.



From left, Faye Akbar, Patrick Cashmore, Phillip Bryant, John Stacpoole and Anna Mclean.

MINES INSPECTORS WELCOMED AT FORUM

The newest recruits to Western Australia's mines safety inspectorate have been recognised at the recent Department of Mines and Petroleum's (DMP) safety forum.

The two-day Biannual Mines Inspectors Forum gives the State's inspectors an opportunity to come together and share experiences, ideas and advice about mine safety.

The department's Mines Safety Director and recently appointed State Mining Engineer Andrew Chaplyn said the forum was an important part of the Reform and Development at Resources Safety program (RADARS).

"The forums really give us the opportunity to come together as an inspectorate and look at how our reform program is going," Mr Chaplyn said.

"Getting feedback from our inspectors to see what is working and where we need to improve is an important part of this process."

Mr Chaplyn said the recent forum was focused on areas of concern raised by inspectors at the previous March forum.

"At the March forum, inspectors discussed our progress on priority targets and what

needed to be addressed in the next few years," Mr Chaplyn said.

Key issues were hazard awareness and control, risk management strategies, and effective leadership and cultural change.

These issues were further broken down into specific areas of concern.

"This kind of focus will help us to develop and implement strategies around these specific areas of concern," Mr Chaplyn said.

"It will also promote consistency among the mines inspectors and explain the department's approach to safety compliance in a practical way for industry."

Mr Chaplyn said department officers were committed to working together to improve safety in Western Australia's mining industry.

"Workers, employers, industry groups, regulators and government need to continue working together to make real, significant and sustained improvements to safety," he said.

SASAC CHAIRMAN VISITS PERTH



Chairman Zhang and DSD Director General Steve Wood exchange gifts. Photo: Ivision Photography

Mr Zhang Yi, Chairman of the State-owned Assets Supervision and Administration Commission (SASAC) in Beijing, recently visited Perth to engage with State-owned Enterprises (SOE) in Western Australia and with local industry.

The Chairman's program included a visit to BHP Billiton's Integrated Remote Operations Centre (IROC), where Jimmy Wilson, President, Iron Ore – BHP Billiton, explained the company's advanced operations. The

IROC brings a range of planning, scheduling, controlling and analysis teams into one location, enabling the coordination of all Pilbara based operations from pit to port.

For a valuable experience of an entirely different nature, the SASAC delegation also inspected the operations of the Perth Mint and witnessed a gold pour.

The Chairman's brief visit culminated in a lunch, hosted in his honour by the Premier of Western Australia, and attended by a

wide range of senior business leaders and SOE heads.

The Chairman's visit reinforced the importance of the high level dialogue between SASAC and the Western Australian Government and helped to improve understanding about business in the State.



Premier Colin Barnett (second from left) at the signing of the Anketell native title agreement in April with, from left, Chair of NAC Board Warren Walker, NAC CEO Paul Stenson, senior elder Pansy Hicks, and senior elder Violet Samson. Photo: Ngarluma Aboriginal Corporation

ANKETELL MOVING ALONG

The development of the Anketell Port and associated infrastructure continues to take shape, with the recent announcement that the joint venture behind the project had entered into an agreement with Aurizon Holdings for rail and port facilities.

American Metals & Coal International (AMCI), Korean steelmaker POSCO and China's Baosteel, which recently launched a successful takeover bid with Aurizon for Aquila Resources, have backed the development and are targeting first exports of iron ore in 2017–18.

"Aurizon is delighted to have secured the agreement of Baosteel, AMCI and POSCO in the Infrastructure Framework Agreement to support the infrastructure requirements for the West Pilbara project," said Aurizon Managing Director and CEO Lance Hockridge.

"These companies are global leaders in the resources and steel sector, bringing the demand and scale required to sustain such a major investment.

"Aurizon's job now is to deliver a commercially attractive and scalable infrastructure solution for Baosteel, AMCI and POSCO. We know that the creation of world-class rail and port export infrastructure is critical to driving globally competitive exports and economic wealth for the country."

Aurizon has put together a project team in Perth supported by Parsons Brinkerhoff, Calibre and AECOM to carry out all infrastructure design tasks within the agreed project timeframes.

The Department of State Development (DSD) will work with the project team as appropriate to ensure that their work meets the State's strategic objectives for Anketell.

The first stage of the project centres on the development of a new deep water port at Anketell, 30 kilometres east of Karratha, and a 280 kilometre railway to support at least 40 million tonnes per annum (Mtpa) throughput from eight mining areas in the Pilbara.

State and Federal environmental approvals have already been granted to enable an initial build that can accommodate an export capacity of 115Mtpa.

The infrastructure has the capacity to be expanded to accommodate additional tonnage from both foundation customers and other miners without access to rail and port infrastructure.

Access to port space has long been an issue for companies in the Pilbara, particularly smaller iron ore miners.

At the signing of a native title agreement with the Ngarluma people of the Pilbara in April, Premier and State Development Minister Colin Barnett said he believed Anketell Port would be the last major port built in the region.

The signing of the Indigenous Land Use Agreement preceded the release of the Anketell Port Master Plan in June 2014, which was jointly developed by the department and the Dampier Port Authority.



The WA Mining Club
**Scholarship
Program**

SCHOLARSHIPS RECOGNISE FUTURE LEADERS

Six students from universities across Western Australia received scholarships as part of the prestigious WA Mining Club Scholarship Program.

Mines and Petroleum Minister Bill Marmion presented the students with their awards at a special ceremony in August.

“The WA Mining Club Scholarship program was created to support the development of the next leaders of our industry,” Mr Marmion said.

“This is a vital commitment into the future of Western Australia’s mining sector, and it is a commitment shared by the State Government.”

Winners receive a A\$10,000 contribution, split over two years, to their university studies in environmental engineering, mineral processing, metallurgy, mining engineering and geology.

The 2014 WA Mining Club scholarships were awarded to:

- Megan Sleep, Murdoch University – Environmental Scholarship (Co-Sponsored by 360 Environmental)
- Kate Philibert, Curtin University – Geology Scholarship (Co-Sponsored by BC Iron)
- Michael Assmann, Curtin WASM – Metallurgy Scholarship (Co-Sponsored by Mets Engineering)
- Paulus Siang Kwie Han, Curtin University – Engineering Scholarship (Co-Sponsored by Mount Gibson Iron)
- Dylan Liebeck, Curtin University – Engineering Scholarship (Co-Sponsored by Western Areas)
- Claire Barber, Curtin WASM – Female Student In A Technical Mining Discipline Scholarship (Co-Sponsored by Mount Gibson Iron)

In addition to the financial grant, scholarship recipients are mentored by senior industry participants in their chosen discipline, and have access to other opportunities with their co-sponsor organisation, such as vacation employment, site visits and networking.



ROUND 10 OF CO-FUNDED DRILLING CLOSES

A new round of grants to boost Western Australia’s mining exploration investment opened in September under Round 10 of the Exploration Incentive Scheme’s (EIS) Co-Funded Drilling Program.

The program was offered to exploration drilling projects to be undertaken in 2015, and has now closed with successful recipients to be notified shortly.

The program encourages drilling programs in underexplored areas to ensure the continued economic prosperity of the State’s resources industry.

Since its inception in 2009, it has offered almost A\$50 million in grants to more than 460 exploration drilling projects.

The State Government’s commitment to explorers under the EIS is expected to reach approximately A\$130 million by 2016–17.

Co-funding in all categories of applications will remain at up to 50 per cent of direct drilling costs and will be capped at:

- A\$150,000 for general multi-hole applications
- A\$200,000 for a single deep hole application

- A\$30,000 for a prospector application.

Co-funding will be available for exploration drilling only. Resource definition drilling and appraisal, stimulation or development drilling will not be eligible for co-funding.

The next round of funding under Round 11 2015–16, will open in February 2015. Further details will be posted on the Exploration Incentive Scheme/Program 2 section of DMP’s website when applications open.

AGRICULTURE

East Kimberley – Ord – Ord/East Kimberley Expansion Project**WA STATE GOVERNMENT**

The Ord East Kimberley Expansion Project is a good example of the Australian and Western Australian governments working closely together with the local community to deliver economic, social and common use infrastructure to the East Kimberley region of the state. The Western Australian Government has invested A\$322m to construct irrigation channels, roads and off-farm infrastructure on the Ord lands. A Development Agreement has been signed with Kimberley Agricultural Investment (KAI) for the lease and development of 13,400ha of irrigation land in the Goomig and Knox Plain areas. KAI, a subsidiary of China's Shanghai Zhongfu Group, proposes to establish a sugar industry in the Kununurra region. The state is currently working towards the release of approximately 5,000ha of Ord West Bank and Mantinea lands via a Request for Proposal process. The Australian Government invested A\$195m for construction of social and common use infrastructure in the East Kimberley region through the East Kimberley Development Package (EKDP) National Partnership Agreement (NPA). Twenty-nine infrastructure projects were delivered over a three year period in health, housing, transport, education and community services. The Yawoorroong Miriung Gajerrong Yirrege Noong Dawang Aboriginal Corporation (MG Corporation) building and the Department of Housing transitional housing were have been successful nominations for the Australian Institute of Architects 2013 Western Australian Architectural Awards. The transitional housing project also achieved a 2013 Premier's Award for Improving Indigenous Outcomes.

Expenditure: \$517m.

INFRASTRUCTURE

South West Region – Kemerton (HUILS – Heavy Use Industrial Land Strategy)**WA STATE GOVERNMENT**

Kemerton Industrial Park (KIP), located 17km north of Bunbury, is the main strategic industrial area in the South West region and the nearest regional heavy industrial site to Perth. It is designed to supplement the Kwinana Industrial Area, only 90 minutes away by road. The estate comprises 7,543ha of land, including 2,019ha of industrial core, 293ha support industry area and 5,231ha buffer areas. It is accessible to the Port of Bunbury by road and a rail link is being planned. The estate is serviced by major road links to the metropolitan area. The KIP currently includes a silicon smelter, a titanium dioxide plant, a chlor-alkali plant, two peak load power stations and a wastewater treatment plant. Under the Heavy Use Industrial Land Strategy, the government is progressing Kemerton towards project ready status by undertaking environmental, heritage and planning approvals for the estate. Work towards progressing approvals commenced in 2009 and is anticipated to be completed in 2014–15, by which time the structure plan and zoning adjustments will also have been completed.

IRON ORE

Pilbara - Chichester expansion and Solomon Mine Project**FORTESCUE METALS GROUP LTD**

Fortescue Metals Group operates four iron ore mines across its two mining hubs, Chichester and Solomon, in the Pilbara. In March 2014, Fortescue officially celebrated the completion of its A\$9 billion expansion, which lifted production capacity to 155Mtpa. The expansion included the construction of the greenfields Solomon Hub in the Hamersley Ranges, comprising Kings Valley and the nearby 20Mtpa Firetail mine; an expansion of the Christmas Creek mine to 50Mtpa; and major extensions of Fortescue's world-class port and rail facilities. Eighty-six per cent of the money spent on the Kings Valley project was spent with Australian suppliers.

Expenditure: \$9b.

Employment: Construction: 7000; Operation: 6000

Pilbara - Port Hedland - Atlas Iron**ATLAS IRON LTD**

Atlas Iron Ltd is an iron ore explorer and miner focused on developing a number of projects in the Pilbara region of Western Australia. Atlas commenced exporting in December 2008 from its Pardoo mine, east of Port Hedland. Since then, Atlas has commenced four other mines – at Wodgina in 2010, Mt Dove in 2012, Abydos in 2013 and the first stage of Mt Webber in 2014. Atlas exported 10.9Mt in the 2013–14 financial year and is forecasting exports of 12.2-12.8Mt (wmt) in the 2014–15 financial year. Atlas operates its current mines on the basis of road haulage to Port Hedland. For the longer-term developments and production beyond 15Mtpa, rail haulage will be preferable due to the scale and distance to port. Atlas is engaging with a number of infrastructure owners and developers with the intent of unlocking the value of Atlas' Horizon 2 assets.

Expenditure: \$950m.

Employment: Operation: 1000

OIL & GAS DEVELOPMENTS

Pilbara – Macedon Domestic Gas Project**BHP BILLITON PETROLEUM (AUSTRALIA) PTY LIMITED**

In September 2013 BHP Billiton Petroleum (Australia) Pty Ltd and Apache Energy Limited commissioned a domestic gas plant for Western Australia at the Ashburton North Strategic Industrial Area near Onslow. The development involves four sub-sea gas wells, a wet gas pipeline, an onshore gas processing plant 11km south-west of Onslow and a sales gas pipeline connected to the Dampier-to-Bunbury Natural Gas Pipeline. Daily gas production capacity is 200TJ.

Expenditure: \$1.5b.

Employment: Construction: 700; Operation: 25

AMMONIUM NITRATE

Pilbara - Burrup Industrial Estate Site D - Yara Pilbara Nitrates**YARA INTERNATIONAL ASA**

Yara, Orica and Apache have formed a joint venture – Yara Pilbara Nitrates Pty Ltd (YPNPL). YPNPL has executed an Engineering, Procurement and Construction (EPC) contract for the construction of a circa 350,000tpa Technical Ammonium Nitrate (TAN) plant to be located on the Burrup Peninsula. Ammonia feedstock will be supplied from Yara Pilbara Fertilisers Pty Ltd (YPFPL), which operates its facility directly adjacent to the proposed location for the new TAN plant. YPNPL will be the operator of the TAN plant and Orica will manage the product sales and distribution. Yara and Orica each have a 45 per cent interest in the joint venture and Apache the remaining ten per cent. It is expected that all manufactured product will be sold into the Pilbara region. Work on the project has commenced and it is expected that the new plant will be commissioned during the third quarter of 2015.

Expenditure: \$800m.

Employment: Construction: 600; Operation: 65

HEAVY MINERAL SANDS

Keysbrook – Heavy Mineral Sands Mine**MZI RESOURCES LTD**

MZI is proceeding to develop a mineral sands mine located near the township of Keysbrook, approximately 70km south of Perth. The project has received environmental approval from the Minister for Environment, as well as development approvals and extractive industry licences from the Shires of Murray and Serpentine-Jarrahdale. Keysbrook has a mineral resource of 78.9Mt at an average grade of 2.5 per cent total heavy mineral (THM) and an ore reserve of 670,000t THM, which underpins the first five-and-a-half years of operations. Based on the total mineral resource estimate, the potential mine life could be more than 15 years. Approximately 110,000tpa of heavy mineral concentrate from Keysbrook will be trucked 120km south to Doral's mineral separation plant in Picton, near Bunbury, where it will be toll treated under a processing agreement. Subject to funding arrangements, MZI plans to commence construction in the first quarter of 2015, with first production scheduled for the fourth quarter of 2015. The project is expected to produce 67,500tpa of leucoxene products and 28,700tpa of zircon concentrate, which will be exported from the Bunbury Port.

Expenditure: \$73m.

Employment: Construction: 100; Operation: 50

INFRASTRUCTURE

Pilbara – Ashburton North Strategic Industrial Area

WA STATE GOVERNMENT

The Western Australian Government is developing the Ashburton North Strategic Industrial Area (ANSIA) as a hydrocarbon precinct in the Shire of Ashburton, 11km south-west of Onslow, to enable the development of natural gas projects and associated industries to exploit the gas reserves in the Carnarvon Basin and Exmouth Gulf. The ANSIA includes three larger sites for major gas processing proponents, secondary processing sites, areas for general support industries and supply base operations, a port with common user facilities to be managed by the Pilbara Ports Authority, and common user access and infrastructure corridors. Two foundation proponents, BHP Billiton Petroleum and Chevron Australia, have taken up land allocations within the ANSIA. BHP Billiton Petroleum commissioned a domestic gas plant last year, with production capacity of 200TJ per day. Chevron Australia's construction schedule is over 40 per cent completed with first LNG exports scheduled for late 2016.

IRON ORE

Pilbara – BHP Billiton Iron Ore – Shiploaders 1 and 2

BHP BILLITON IRON ORE PTY LTD

During the December 2013 quarter, BHP Billiton approved an investment of US\$301 million (BHP Billiton share) to replace shiploaders 1 and 2 at the company's Nelson Point operations in Port Hedland. The two new shiploaders will increase the reliability of its inner harbour port facilities and create additional port capacity that will be utilised as a series of debottlenecking initiatives to increase the capacity of BHP's supply chain to approximately 260Mtpa to 270Mtpa (100% basis), at a low capital cost. Commissioning of the two replacement shiploaders is scheduled for the second half of the 2014 calendar year.

Expenditure: \$407m.

Employment: Construction: 500

Pilbara – Roy Hill Iron Ore Mine & Infrastructure ROY HILL HOLDINGS PTY LTD

Roy Hill Holdings is a private company which is majority-owned by Hancock Prospecting Pty Ltd, and also has key international investment partners with strategic steel-making interests. It is developing the Roy Hill iron ore project located 115km north of Newman. This project is expected to come into production in 2015 and will produce 55Mtpa of iron ore for 20 years following ramp-up. The project includes mine development, mine processing infrastructure, a new heavy-haul railway, and significant new port facilities at Port Hedland's inner harbour. Environmental approval for Roy Hill mine Stage 1 was received in December 2009 and environmental approval for Stage 2 was received in March 2010. In July 2011, Roy Hill Infrastructure was granted a Special Railway Licence to develop a 344km railway from its mine in the eastern Pilbara to Port Hedland. All primary approvals have been secured and major project works commenced in 2012. Dredging of the new berth areas at South West Creek was finished ahead of schedule, the airstrip and internal mine roads have been completed, and the rail construction, mine and port accommodation villages are completed and being utilised. As of August 2014, over 4000 construction workers were engaged across the project. In addition, the new Corporate HQ and Remote Operations Centre at the Perth International Airport business precinct is now completed and operational. Considerable works are already underway on port, rail and mine construction with the 50 per cent completion milestone being reached in late July 2014. Roy Hill secured the world's largest ever debt financing package for a mining project of US\$7.2b in March 2014.

Expenditure: \$10b.

Employment: Construction: 4000; Operation: 2000

IRON ORE PROCESSING

Pilbara – Cape Preston – Sino Iron CITIC PACIFIC

The Sino Iron project is located at Cape Preston, 100km south-west of Karratha. Construction of the largest magnetite mining and processing project in Australia is at an advanced stage, with limited production from the first and second of six lines commencing in 2013. On completion, the project will comprise of in-pit crushers, six autogenous and six ball mills, concentrators, 6Mtpa pellet plant, 25km slurry pipeline, combined cycle 450MW power station, new port and trans-shipment facilities, and a 51GL desalination plant. At full production the project will export up to 21.6Mtpa of magnetite concentrate and 6Mtpa of high grade pellets. The first shipment of ore occurred on 2 December 2013.

Expenditure: \$5.2b.

Employment: Construction: 4000; Operation: 500

OIL & GAS DEVELOPMENTS

Carnarvon Basin – Greater Western Flank Phase 1

WOODSIDE ENERGY

The Greater Western Flank Phase 1 Project will develop the Goodwyn GH and Tidepole fields, via a subsea tie-back to the existing Goodwyn A Platform. The project remains on schedule for start-up expected in early 2016.

Expenditure: \$2.5b.

Carnarvon Offshore Basin - Barrow Island - Gorgon Project

GORGON JOINT VENTURE

The Gorgon Joint Venture (GJV) made its final investment decision on the Gorgon Project in mid-September 2009. The Foundation Project on Barrow Island is a three train LNG development with a nameplate capacity of 15.6Mtpa and includes a domestic gas plant capable of delivering at least 300TJ/d of gas to the mainland. Cost estimates for the project construction have been reassessed at A\$62.1b (US\$54b) following a cost and schedule review conducted by Chevron in December 2013. The project involves the processing of gas from both the Gorgon and Jansz/lo gas fields and includes potentially the largest commercial CO2 geosequestration project in the world. The project obtained state and federal environmental approvals in August 2009. On-island activity started in late 2009 and the major construction work for the processing plant commenced in 2011. Plant start-up and first gas is planned for mid-2015, with the provision of domestic gas by 31 December 2015.

Expenditure: \$62.1b

Employment: Construction: 6250; Operation: 300

Pilbara – Wheatstone LNG Development CHEVRON AUSTRALIA PTY LTD

Chevron Australia Pty Ltd is currently constructing an LNG plant, domestic gas plant and port facilities at the Ashburton North Strategic Industrial Area near Onslow for its Wheatstone project. The project will initially have two LNG trains with a combined capacity of 8.9Mtpa, expandable to five or six trains with a total capacity of 25Mtpa, and a 250Mcf per day domestic gas plant connected to the Dampier-to-Bunbury Natural Gas Pipeline. The construction schedule is currently over 40 per cent completed. The first export of LNG is scheduled for late 2016.

Expenditure: \$29b.

Employment: Construction: 6500; Operation: 400

AMMONIA/UREA

Shotts Industrial Park – Collie Coal to Urea PERDAMAN CHEMICALS AND FERTILISERS PTY LTD

Perdaman Chemical and Fertilisers Pty Ltd is proposing to develop a A\$3.5b coal to urea plant at the new Shotts Industrial Park, near Collie. The plant will use proven coal gasification and fertiliser production technologies. Around 2.7Mtpa of coal will be used to produce approximately 2Mtpa of urea, primarily for export. The urea will be transported to Bunbury Port by rail. A 20-year off take agreement has been signed with Incitec Pivot. The coal supply contract is yet to be finalised. The company has received all its environmental and all other approvals from both the Western Australian and Australian governments. Construction is on hold as the company is still seeking to finalise a suitable domestic coal supply arrangement prior to achieving its financial investment decision.

Expenditure: \$3.5b.

Employment: Construction: 2000; Operation: 200

HEAVY MINERAL SANDS

Shark Bay – Coburn Zircon Project GUNSON RESOURCES LIMITED

Gunson proposes to develop the Coburn zircon project, located south of Shark Bay and approximately 250km north of Geraldton. It contains total ore reserves of 308Mt at an average grade of 1.2 per cent heavy minerals, all of which lie within the portion of the project area that has received government environmental approvals for mining. At a mining rate of 23.4Mtpa, the project is expected to produce 49,500tpa of zircon, 109,000tpa of chloride ilmenite and 23,500tpa of a mixed rutile-leucoxene over its 19-year mine life. The company has secured all of the approvals required to commence mining and processing operations at Coburn, and is continuing to pursue discussions with parties having a potential interest in acquiring a major stake in the project.

Expenditure: \$202m.

Employment: Construction: 170; Operation: 110

INFRASTRUCTURE

Dampier Peninsula – Browse LNG Precinct WA STATE GOVERNMENT

The Western Australian Government is developing the Browse Liquefied Natural Gas (LNG) Precinct approximately 60km north of Broome. By focussing development at a suitable location, the precinct will minimise the environmental footprint of gas processing and any social impacts in the region while maximising opportunities for the local community to benefit from development of the Browse Basin gas fields. The precinct will have the capacity to accommodate at least two LNG processing operations, with a combined capacity of up to 50Mtpa. The Western Australian Government has acquired the land for the Precinct and will secure all relevant approvals to ensure the Precinct is 'project ready.'

Pilbara – Anketell – Anketell Port and SIA (Strategic Industrial Area)

WA STATE GOVERNMENT

The Anketell project involves the establishment of a multi-user, multi-commodity deep water port and associated strategic industrial area (SIA) at Anketell, located 30km east of Karratha on the Pilbara coast. The port and associated infrastructure will be a proponent-funded but state-controlled port which will be managed and operated under the Port Authorities Act 1999. The strategic industrial land will fall under the jurisdiction of the Western Australian Land Authority (LandCorp). During its initial phase, it is expected that Anketell will be an iron ore export facility and that, at its peak capacity, not less than 350Mtpa will be exported to customers, mainly in Asia. A number of iron ore producers with mining assets in the Pilbara have expressed interest in using the planned facilities at Anketell. It is likely that the port will be developed in stages to accord with the development of the various mining operations which are located throughout the Pilbara. The Anketell Port Master Plan was released in June 2014 and a downloadable copy can be obtained from the DSD website.

IRON ORE

Pilbara – West Pilbara Iron Ore Project API MANAGEMENT PTY LTD

The Australian Premium Iron Joint Venture is proposing to develop the West Pilbara Iron Ore Project. Stage 1 of the project is based on the production of 40Mtpa of direct shipping iron ore from deposits, including Red Hill and Mt Stuart deposits, located 35-80km south-west of Pannawonica. The ore will be transported by a new heavy haul railway for export via the proposed multi-user 350Mtpa port at Anketell. Subject to the successful completion of feasibility and environmental studies, and receipt of government regulatory approvals, the company anticipates construction to commence following a decision to proceed by the joint venturers and completion of funding arrangements. Primary state and federal environmental approvals for the mine and rail elements of the project were received in December 2011, and for the first stage of Anketell Port in the first half of 2013.

Expenditure: \$7b.

Employment: Construction: 3500; Operation: 1000

Yilgarn – Deception Iron Ore Deposit CLIFFS ASIA PACIFIC IRON ORE PTY LTD

Cliffs proposes to expand its Koolyanobbing Operation to include an additional iron ore mining area at the Deception Deposit, located approximately 150km north of Southern Cross. The Deception Deposit contains an estimated 7.1Mt of iron ore and is expected to have a mine life of around 5 years. Mining of the Deception Deposit has environmental approval with first production expected in first half of 2017.

Expenditure: \$35m.

NICKEL

Mt Windarra – Windarra POSEIDON NICKEL NL

Poseidon Nickel Ltd has submitted a project development proposal for the redevelopment of the Mt Windarra underground nickel mine and associated project infrastructure at Mt Windarra. Subject to obtaining all relevant approvals Poseidon is forecast to commence mining in 2015. Expenditure: \$250m.

Employment: Construction: 80; Operation: 180

OIL & GAS DEVELOPMENTS

Canning Basin – Buru Canning Basin Tight Gas BURU ENERGY

The Buru Energy/Mitsubishi Joint Venture (JV) is preparing to test the commercial potential of the Laurel Formation, a large onshore natural gas resource located in the Canning Basin. All regulatory approvals for the program have been received and the JV has completed site works at its eastern well sites in preparation for the upcoming tests. Diagnostic testing using mini-fracs are planned to be undertaken in late 2014 with the next phase of the fracking program undertaken early in the 2015 dry season. In preparation, the JV is continuing with a baseline groundwater monitoring program to measure the impact of activities on groundwater. The JV is actively engaged in identifying training and employment opportunities for the Noonkanbah and Yawuru communities with the creation of 14 casual positions from the Noonkanbah community with civil works contractors at the well sites during the last four months. The JV is working with the Kimberley Training Institute (KTI) to commence a program at Yungngora community for Certificate II Resources and Infrastructure Work Preparation. Should the resource prove to be commercially viable, gas from the Canning Basin will provide energy security to Western Australian domestic and industrial markets. Under a State Agreement the JV, upon proving up sufficient reserves, is obligated to supply at least 1,500 petajoules of gas into the Western Australian domestic market.

Expenditure: \$40m.

Employment: Operation: 30

Kalgoorlie - Tropicana Gas Pipeline Project Gas

ANGLOGOLD ASHANTI/APA GROUP JOINT VENTURE

APA Operations Pty Ltd, a subsidiary company within the APA Group (APA), plan to construct and operate a 294km high pressure natural gas pipeline to convey gas from the Murrin Murrin gas lateral pipeline (licence PL 36) to the Tropicana Gold Mine. The project has been referred to the Environmental Protection Authority and is being assessed. Construction works for the pipeline and associated facilities on site are scheduled to start in 2015 with first gas delivery planned for early 2016.



Major Resource Projects

December 2014



Mineral symbols	Commodities
◆ Precious metal	Ag.....Silver
Au (or as shown)	Al.....Alumina
◆ Steel alloy metal	Au.....Gold
Ni (or as shown)	Cr.....Chromium
◆ Speciality metal	Cu.....Copper
Ti-Zr (or as shown)	Fe.....Iron
▲ Base metal	K.....Potassium
■ Iron	Li.....Lithium
■ Alumina	LNG.....Liquefied natural gas
Bx (or as shown)	LPG.....Liquefied petroleum gas
● Coal and lignite	MgCO ₃Magnesite
▼ Industrial mineral	Mica.....Mica
⊠ Processing plant	Mn.....Manganese
	Mo.....Molybdenum
	Pb.....Lead
	Pd.....Palladium
	Phos.....Phosphate
	Pt.....Platinum
	REE.....Rare earth elements
	Sid.....Silica sand
	Ta.....Tantalum
	Ti.....Titanium
	V.....Vanadium
	W.....Tungsten
	Zn.....Zinc

Petroleum symbols
● Gas field
● Oil field
● Oil and gas field
⊠ Significant gas discovery
▲ Processing plant
— Oil / gas pipeline, operating
- - - Oil / gas pipeline, proposed

Infrastructure
■ Power plant
■ Irrigation / water / desalination
■ Port

Data for offshore Commonwealth controlled waters is up-to-date as of December 2013. Enquiries for latest information for Commonwealth controlled waters is available from the National Offshore Petroleum Titles Administrator (NOPTA) at <info@noppta.gov.au>



Project labels:

Projects operating or currently under development with an actual or anticipated value of production greater than A\$10 Million are shown in blue

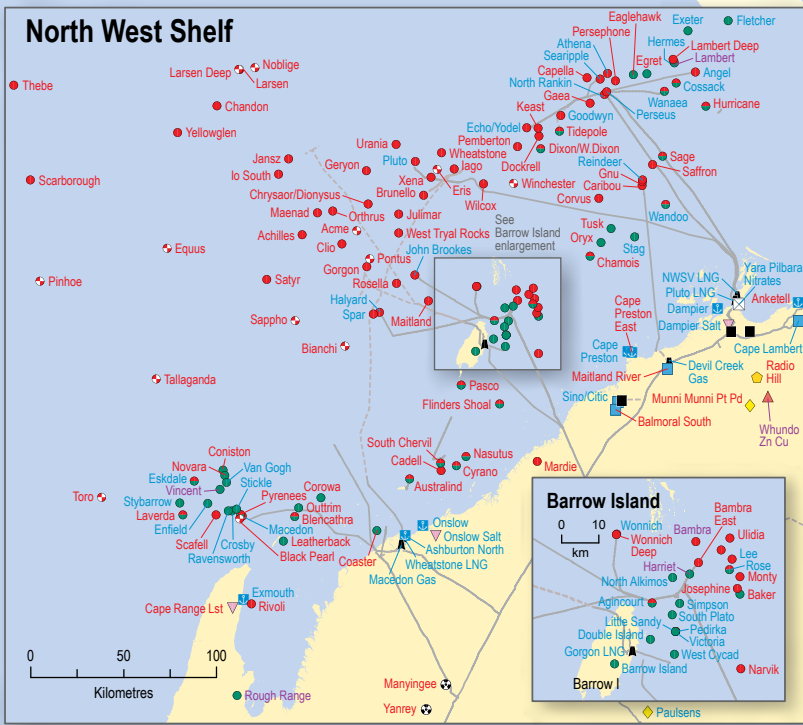
Proposed or potential projects with a capital expenditure greater than A\$20 Million are shown in red

Projects under care and maintenance are shown in purple



Kwinana-Rockingham
⊠ Alumina refinery
⊠ Ammonium nitrate
⊠ Bulk Terminal
⊠ Cement and lime
⊠ Chlor alkali
⊠ Desalination
⊠ Fused alumina
⊠ Fused zirconia
▲ LNG
▲ LPG
⊠ Nickel refinery
▲ Oil refinery
⊠ Power station
⊠ Sodium cyanide
⊠ Titanium pigment
⊠ Zirconia

North West Shelf



Major Resource Projects December 2014

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Projects under care and maintenance are shown in purple



Commodities

- Ag.....Silver
- Au.....Gold
- Co.....Cobalt
- Cu.....Copper
- Fe.....Iron
- Fl.....Fluorite
- Gp.....Gypsum
- Gr.....Graphite
- Grt.....Garnet
- K.....Potassium
- Kln.....Kaolin
- Lst.....Limestone
- LNG.....Liquefied natural gas
- Mag.....Magnetite
- Mn.....Manganese
- Nb.....Niobium
- Pb.....Lead
- Pd.....Palladium
- Pt.....Platinum
- REE.....Rare earth elements
- Ti.....Titanium
- V.....Vanadium
- W.....Tungsten
- Zn.....Zinc
- Zr.....Zirconium

Mineral symbols

- ☆ Precious mineral
 - ◆ Precious metal (Au or as shown)
 - ◇ Steel alloy metal (Ni or as shown)
 - Speciality metal (Ti-Zr or as shown)
 - ▲ Base metal
 - Iron
 - Alumina (Bx or as shown)
 - Coal and lignite
 - ⊕ Uranium
 - ▽ Industrial mineral
 - ⊠ Processing plant
- ## Petroleum symbols
- Gas field
 - Oil field
 - Oil and gas field
 - Significant gas discovery
 - Significant oil and gas discovery
 - ▲ Processing plant
 - Oil / gas pipeline, operating
 - - - Oil / gas pipeline, proposed

Infrastructure

- Power plant
- ▲ Irrigation / water / desalination
- Port

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